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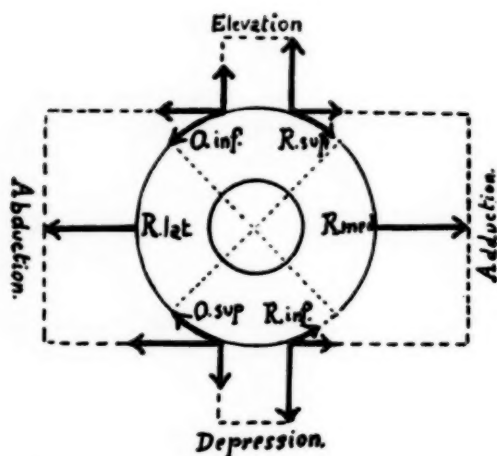


Fig. 1. Schematic plan showing action of ocular muscles. (After Marquez as illustrated in Fuchs' textbook, 5th ed., p. 716).

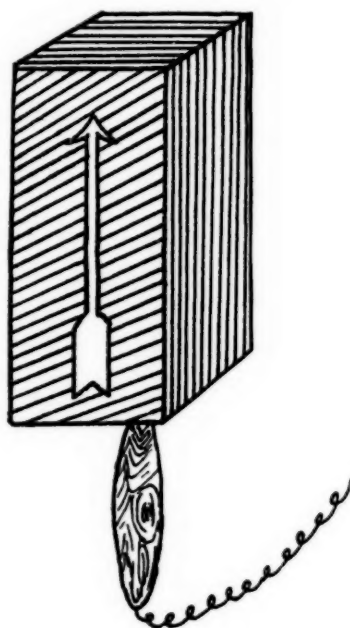


Fig. 4. Diagram of box providing illuminated arrow to be used in muscle tests.

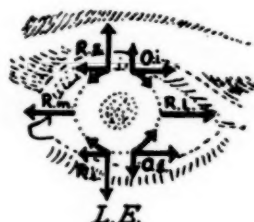
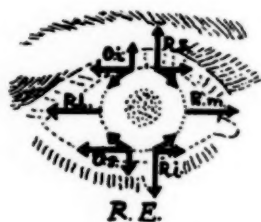


Fig. 2. Schematic plan of figure 1 superimposed on diagram of right and left eyes.

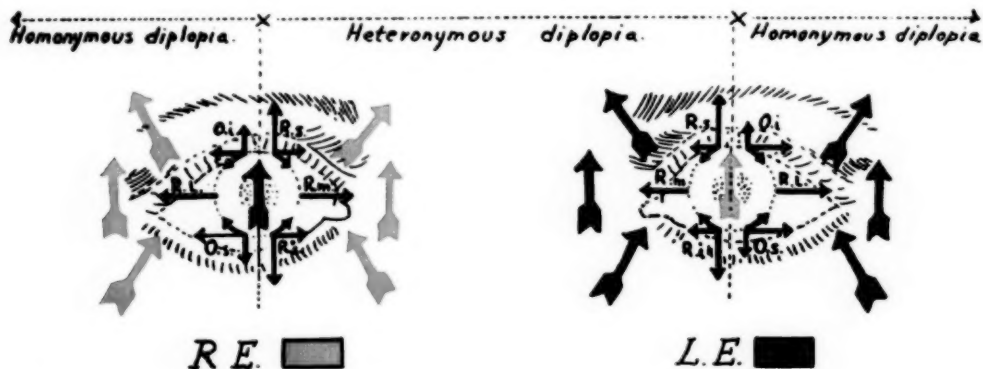


Fig. 3. Same as figure 2 with colored arrows indicating displacement of image in case of paralysis of any ocular muscle.

NEW DIAGRAM FOR TESTING BINOCULAR DIPLOPIA (RAMON CASTROVIEJO)

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Number 1

ELECTIVE LOCALIZATION IN DETERMINING THE ETIOLOGY OF CHRONIC UVEITIS

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AND

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In many cases streptococci having elective localizing power have been isolated in uveitis, especially in the acute form. Different foci have been found. The most frequent were teeth, tonsils, prostate, or cervix. Removal of these foci and treatment with autogenous vaccines prepared from the involved eyes of rabbits that had received injections, have been generally efficacious. From the Division of Experimental Bacteriology, The Mayo Foundation. Read in a symposium on chronic uveitis at the second annual meeting of The Association for Research in Ophthalmology, Philadelphia, June 9, 1931.

That streptococci readily change in virulence has been known ever since they have been cultivated on artificial media, and that streptococci are the cause of many different diseases has also been known for a long time. The results from efforts at classification of streptococci especially on the basis of their power to ferment sugars, although useful in certain respects have little in common with their power to produce disease. The usual tests for virulence, death or survival following intraperitoneal or subcutaneous injection although reliable for the more fixed and highly virulent species of microorganisms and useful as tests for general virulence of streptococci, do not suffice to measure peculiar or specific effects of especially those strains that have a low general virulence.

In a series of experiments carried out in the period from 1912 to 1914, by Rosenow¹³, on the mutation or "dissociation" of streptococci and pneumococci, in which typical strains of each became transmuted, marked changes in localization on intravenous injection of animals were noted coincidental with changes in morphology, cultural characteristics, and immunologic properties. It was found that animals which seemingly were well, following intravenous injection often revealed striking lesions when anesthetized for examination, and

that iritis and other lesions of the eye occurred following injection of "laboratory" strains of streptococci and pneumococci but only after a certain number of passages through animals. The results of these experiments suggested that different diseases caused by streptococci or pneumococci may not always be due to different and distinct strains, but that some may be due to the same strain having acquired specific or elective affinity for the tissue or organs affected.

The experiments in rheumatic fever, endocarditis, and ulcer of the stomach performed about that time emphasized the importance of partial tension methods in the isolation of causative streptococci and the need for injection of freshly isolated strains to measure their localizing or disease-producing power. The importance of localized, often symptomless, foci as sources of infection in various diseases had also become apparent chiefly through the work of Billings. Therefore, it was determined to study the etiology of different diseases by methods which, so far as possible, fulfilled these requirements, and in which the focus was considered a good place to search for the causative organism.

Specific or elective localizing power of freshly isolated streptococci has been shown to occur in a large series of cases

in which patients were suffering from various diseases, including diseases of the eye, and the results have been reported from time to time^{4, 7, 9-12, 14, 18, 20}. Reference to published reports by others of clinical and experimental studies indicating the importance of foci of infection and their elimination, and the elective localizing power of streptococci isolated from them in diseases of the eye has been made in previously published reports¹⁷.

In 1916, Irons, Brown and Nadler⁶ reported the successful production of iridocyclitis in rabbits by the intravenous injection of streptococci isolated in cases of acute iridocyclitis. They were able to show that the power of the streptococcus to invade special tissues may change within a short time during residence in the host, during passage through an animal, and in cultures.

In 1921, Meisser and Gardner⁸ reported the experimental production of iritis in rabbits through two animal passages, with a streptococcus isolated from an infected tooth in a case of acute iritis.

Haden⁵, in 1923, in a long series of experiments in cases of acute iritis, episcleritis, uveitis, and hyalitis, has had similar results. He reported finding lesions of the eye in 68 percent of sixty-six rabbits injected with freshly isolated cultures from teeth of patients suffering from metastatic infections of the eye. Of the control group, in which parallel injections were made of cultures from infected teeth in persons that were well or were suffering from some other condition, lesions of the eye developed in only 14.8 percent of 169 rabbits injected. He also emphasized the importance of the use of proper technic in order to avoid misleading results, and among other conclusions, stated that "teeth which are negative in the radiograph may bear as important an etiologic relation to disease as those which show evident infection." The ocular lesions induced in the animals resembled, in many respects, those noted in patients, as regards clinical appearance, structures involved and microscopic changes, and were due in all instances to localization of the organism.

He also noted recurrence of attacks in rabbits.

It is our purpose here to summarize the results obtained from study of elective localization of streptococci freshly isolated from various foci in cases of disease of the uveal tract, as previously reported by us¹⁷, or by our associates, to record unpublished data along the same line, including histologic studies of the experimentally infected eyes, and to report results of new experiments in which elective localizing power of the living streptococci, the heat-killed cultures or suspensions, and the corresponding filtrates, were studied by different methods of inoculation.

The results from intravenous injection of the freshly isolated streptococci obtained from various foci of eighty-seven patients suffering from acute, chronic, primary, or recurring attacks of iritis, uveitis, or iridocyclitis have been previously reported¹⁷. Altogether 272 rabbits were given injections. Of these, 112 (41.6 percent) were seen to have lesions of the eye. The highest incidence of lesions in other organs (joints) was only 5 percent. Streptococci derived from patients who had diseases of other organs or systems than of the eye, injected in like manner and like dosage, rarely caused manifestations in the eyes. Thus, in only 1 percent of 222 rabbits which received injections of streptococci from eighty-five cases of acute appendicitis lesions of the eye developed. The incidence of ocular localization ranged from 0.4 to 1.9 percent in a large series of animals given injections of streptococci derived from a large number of cases, respectively of ulcer of the stomach or duodenum, erythema nodosum, chronic arthritis, myositis, and controls. In the experiments in rheumatic fever and herpes zoster, diseases in which the eyes are involved comparatively often, ocular manifestations, chiefly iritis, developed in 9.9 and 9.6 percent of two series of animals that were given injections. It became apparent that the early ocular reaction was more marked and progressed far more often into the infective phase, following injection of streptococci derived from patients with an acute condition than

from those with a mild or chronic condition. The incidence of ocular reactions in 41.6 percent of the rabbits which received injections of streptococci derived from eighty-seven patients who had diseases of the eye, it should be pointed out, includes all cases studied, irrespective of whether the condition was acute or chronic. In a smaller series, reported by Nickel¹¹, it was found that the incidence of ocular manifestations was 34 percent if the streptococci were derived from patients who were taken indiscriminately, whether or not their condition was acute or chronic, whereas it was 75 percent if the streptococci were derived from patients whose condition was acute.

We have attempted to determine, by means of experiments on elective localization, the relative importance of local infections in tonsils, teeth, prostate

gland, and uterine cervix in persons who had diseases of the eye, arthritis, myocarditis and endocarditis, ulcer of the stomach or duodenum, and in controls. The results are summarized in table 1. Striking evidence of specificity of the streptococcus isolated from each of the foci was obtained. Evidence of such specificity was not obtained in the control group. Of the 215 rabbits which received injections of seventy-four cultures of streptococci derived from the different regions of sixty-nine patients who had intra-ocular lesions, iritis or other lesions of the uveal tract developed in 48 percent. The incidence of ocular localization in that portion of the 215 animals that received injection of cultures from the tonsils was 67 percent; from infected teeth, 53 percent; from the prostate gland, 40 percent, and from the uterine cervix, 50 percent.

Table 1

LOCALIZATION IN RABBITS OF BACTERIA ISOLATED FROM VARIOUS FOCI OF INFECTION

Cultures from patients having:	Source of culture	Cultures	Animals	Lesions, percent										
				Eyes	Joints	Heart	Muscles	Skin	Stomach or duodenum	Kidney	Gallbladder	Liver	Lung	Bowel
Lesions of the eye (69 cases)	Tonsil	11	30	67										
	Teeth	17	51	53										
	Prostate	36	84	40										
	Cervix	12	48	50										
	Total	74	215	48	4	3	3	1	1	3	1		1	
Arthritis (204 cases)	Tonsil	74	152		51									
	Teeth	34	75		57									
	Prostate	86	180		55									
	Cervix	21	48		35									
	Total	215	455	1	53	3	4		5	2	1	2	2	1
Myocarditis and endocarditis, (11 cases)	Tonsil	5	14			28								
	Teeth	2	14			50								
	Prostate	6	11			27								
	Total	13	39	3	18	39	5			5	3	5	10	
Ulcer of stomach and duodenum (205 cases)	Tonsil	120	284						52					
	Teeth	79	215						47					
	Prostate	67	156						47					
	Total	266	655	1	4	2	2	2	48	3	1		3	2
Control group (64 cases)	Tonsil	23	49											
	Teeth	10	23											
	Prostate	41	89											
	Cervix	5	20											
	Total	79	181	1	7	3	5		3	5	3	2	7	

The results with cultures of organisms derived from the different foci of patients who had each of the other diseases were similar, but the streptococcus, isolated instead of causing reactions predominantly in the eyes, revealed a marked tendency to localize electively and to produce lesions in the animals in tissues corresponding to those affected in the patients from whom the organisms were isolated. The patients of the control group, from whom the organism derived did not localize electively, were not given definite diagnoses, or were suffering from conditions not attributable to streptococci. The incidence of lesions in tissues or organs other than in those involved in the patients in each of the diseases studied is very low and about the same as in the control group.

In our experiments on elective locali-

zation, the number of animals which received injections of organisms derived from each patient was usually, although not always, the same; hence, the recorded average incidence of elective localization is not entirely accurate. It is estimated that the discrepancy could be no greater than 5 percent in any of the series reported. However, to cover the point, Cook, working with us, studied the elective localizing power of streptococci isolated from infected teeth of patients who had iritis, chronic ulcerative colitis, cholecystitis, nephritis, ulcer of the stomach or duodenum, arthritis, myositis, and of patients who were taken as controls. Each of four rabbits, weighing from 1,500 to 2,000 gm., was given an injection of approximately 0.3 cc. for each 100 gm. of body weight of the primary glucose-brain broth cultures made from infected teeth

Table 2

LESIONS IN RABBITS FOLLOWING INTRAVENOUS INJECTION OF STREPTOCOCCI ISOLATED FROM INFECTED TEETH

Cultures from patients having	Strains	Animals injected	Mortality rate, per cent	Percentage of animals having lesions in:							
				Eyes	Colon	Gallbladder	Kidneys	Stomach or duodenum, or both	Joints	Muscles	Heart
Iritis	22	88	13	55	0	3	2	6	2	0	1
Colitis	32	128	58	0	44	3	5	8	9	2	1
Cholecystitis	17	68	45	0	0	32	4	4	1	0	0
Nephritis	16	64	43	0	0	2	31	6	5	0	2
Ulcer of stomach or duodenum	29	116	51	0	0	4	5	48	3	3	0
Arthritis	28	112	22	0	0	3	3	5	40	10	3
Myositis	11	44	25	0	0	5	2	9	15	41	2
Control cases	100	400	32	0	0	5	7	5	8	5	2

of each patient studied. A second injection of like amount, was given twenty-four or forty-eight hours later, if a rabbit was symptomless. The rabbits that survived were chloroformed three or four days after the second injection. A summary of these experiments is given in table 2. The incidence of elective localization was marked in this series in each group, especially in the group with iritis. Lesions in other organs occurred rarely following injection of specific strains, and was about the same as in the control group.

Elective localization following different methods of inoculation of the living streptococcus

Forty-five rabbits and eight dogs were inoculated by different methods with living streptococci isolated from various foci of ten patients who had diseases of the eye in order to simulate more closely the conditions that occur in patients. The diagnoses in the ten cases supplying the material for this study were as follows: hyalitis with vitreous opacities in two, iritis in three, iridocyclitis in two, follicular corneal ulcers in one, vitreous opacity with hemorrhage in one and conjunctivitis in one. The condition had existed from two weeks to thirteen years. The dosage varied greatly in the different experiments. Usually 0.5 cc. of the twenty-four hour, glucose-brain-broth culture for each 100 gm. of body weight was used for intravenous and intraperitoneal injection. In most animals only one of these injections, in a few two injections, twenty-four hours apart were given. For injection into the cavity of the lower jaw and into the tibia the culture was concentrated five times, and from 0.1 to 2 cc. was injected, usually only once, in a few instances twice, twenty-four hours apart, through a small hole made with an awl. A short needle punctured through a thick rubber disc to prevent regurgitation was used to make these injections. The dense suspension was also used to inoculate the teeth of rabbits and dogs. The teeth were drilled into, the pulps were severely traumatized or extirpated, and the inoculum sealed in the

pulp chamber with amalgam. The method used in the devitalization and infection of teeth in dogs was identical to the one used by Rosenow and Meiser²² in the production of renal calculi with streptococci derived from patients with nephrolithiasis by the same method of investigation as in the production of nephritis with staphylococci derived from cases of nephritis²¹, and by Cook in the production of ulcerative colitis with the diplostreptococcus derived from patients with chronic ulcerative colitis. For intracerebral injection, 0.1 cc. was used.

As little as 2 cc. injected intravenously and 0.5 cc. injected into the tibia (focus) sufficed to cause the ocular reaction. Control intravenous and intratibial injections of like amounts of various batches of uninoculated glucose-brain broth were made usually with negative results. Organisms from one of the ten patients were injected into only one rabbit; the strains from all but this one patient caused moderate to marked specific ocular effects. In most instances the primary culture in glucose-brain broth derived from the focus of the patient or from the involved eyes of rabbits that previously had received injections was employed. In some instances, however, the streptococcus, after as many as twenty-five rapidly repeated subcultures in glucose-brain broth, was also injected, and with positive results. In several instances a single aerobic plating on blood agar sufficed to destroy specificity. The living cultures were injected intravenously in twenty-two rabbits, intraperitoneally and intracerebrally in one rabbit each, into the tibia in fifteen, into the lower jaw in two, into the upper incisors in two, and by intranasal applications through gauze soaked with the culture in two. Typical ocular reactions occurred following each of the several methods of inoculation, as is illustrated in figure 1. In nineteen (86 percent) of the twenty-two rabbits that received intravenous injection the primary reaction developed and in six (27 percent) the secondary or infective phase.

Of the forty-five rabbits that were given injections by these several meth-

ods, forty (88 percent) revealed the temporary ocular reaction in varying degree. Among these it was marked in twenty-one (47 percent), moderate in ten, and slight in nine. One of the five which did not react was given an injection of a culture in glucose-brain



Fig. 1. Eyes of a rabbit that was given injection intravenously with the primary culture of the streptococcus from a pulpless tooth of a patient suffering from iridocyclitis, with a normal control. Marked circumcorneal and conjunctival congestion of the vessels in the eyes of the rabbit that was given the injection and its absence in the eyes of the normal control rabbit may be noted.

broth after one plating of a strain which before plating, and even after many frequently repeated subcultures in glucose-brain broth, had caused typical ocular reactions in a series of animals. One was given an injection into the tibia with the primary culture from the tonsil, one with a culture from the

tooth, and two with cultures from the nasopharynx. In fourteen (35 percent) of the forty rabbits in which marked to extreme primary reactions developed, varying degrees of clouding of the fluid in the anterior chamber appeared, with or without exudation over the iris (infective phase). Of the fourteen rabbits in which persistent iritis developed, five were given injections intravenously, four into the tibia, and two into the lower jaw; in one rabbit the upper incisors were infected, and in two the nose was packed with gauze soaked in the culture. Only seven of the forty-five rabbits died from invasion of the blood by the streptococcus injected. Five died of infection with *alkaligenes bronchisepticus*. The central nervous system of six animals was invaded by the streptococcus. All of these animals were given inoculation into the tibia, lower jaw, or teeth. In two, invasion of the central nervous system appeared to have occurred from extension of marked posterior uveitis along the lymphatics surrounding the optic nerve. The primary ocular reaction was more marked, lasted longer, and occurred more often and with smaller dosage following injection or inoculation of bony cavities or teeth (foci) than following intravenous injection. In two of the forty-five rabbits that were given injections in this series, both of which revealed mild ocular reactions, acute streptococcal cholecystitis developed, in one after four subcultures of the streptococcus, including one aerobic plating, and in one after one animal passage of the same strain. In three, mild arthritis developed after intravenous injection, and in one, marked diarrhea and lesions of the colon followed intratibial injection after one animal passage and three subcultures of the same strain. In only five of the fifteen rabbits which received injection into the tibia, marked local swelling with secondary arthritis of the knee joints developed.

A graphic representation of what occurred in the eyes of rabbits following these methods of inoculation is given in figure 2. If the primary reaction was slight or moderate the late or infective phase did not develop. If the primary

reaction was marked, early recovery might still occur, but in some the actively infective phase developed, whereas in all with extremely marked symptoms the infective phase developed and lasted for several to many days. In no instance did panophthalmitis develop.

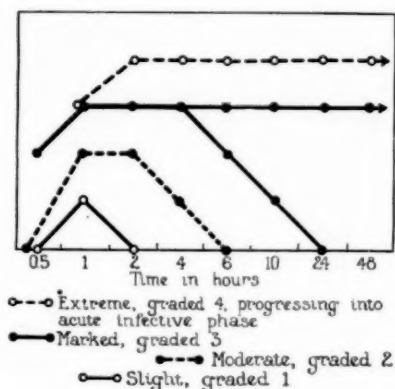


Fig. 2. Ocular reactions in rabbits following injection of streptococci from iritis.

The teeth of seven dogs were infected with four strains derived from patients with iritis. The strains had caused typical reactions in the eyes of rabbits and one dog following intravenous injection. In three of these the primary reaction associated with lacrimation and photophobia appeared; this disappeared in a few days without clouding of the vitreous. In no instance was iritis or uveitis associated with clouding of the aqueous humor nor were other changes observed in the course of from four months to three years, the duration of the experiments in which the teeth were infected only once. This was true despite the fact that the streptococcus, isolated many months later from the infected teeth of three of the dogs, had retained specific affinity for the uveal tract, as determined in rabbits on intravenous injection.

Cultures made of the dry material found in the pulp chambers from eight to twenty months after the teeth of two dogs had been infected remained sterile, whereas those made from the apical end after extirpation yielded the streptococcus. Roentgenograms of these were positive and the apices

were surrounded by granulation tissue. In one dog, the teeth of which were infected twice, well marked evidence of iritis or uveitis developed after the second inoculation, indicating that the structures in the eye had become allergic. The animal was young and healthy and weighed 16 kg. The pulp chambers were large. The four cuspids were drilled into, the pulps removed, and the sediment of the primary culture from the eye of a rabbit in which iritis developed following intravenous injection of the streptococcus from an infected, pulpless tooth derived from a case of acute iridocyclitis, was placed into the pulp chambers and the openings were sealed with amalgam. Lesions of the eye did not develop, and the animal remained well. The infected teeth became discolored, but remained firmly in place and roentgenograms revealed small regions of rarefaction at the apices nearly three years after inoculation. The amalgam fillings were then removed, the apical regions of the previously infected teeth were traumatized with broaches through the root canal, and a small amount of culture of streptococci, derived from a patient with iritis, and which had remained viable for two and a half years at the apices of the pulpless teeth of a dog and had retained affinity for the eyes of rabbits, was placed into the pulp chambers and the openings again sealed with amalgam. Seven hours later marked circumcorneal congestion and dilatation of the vessels of the iris of both eyes, moderate photophobia, and lacrimation had developed. These symptoms continued for two days, when moderate clouding of the fluid in the anterior chamber developed, and this, in turn, continued unabated for two days. These symptoms then gradually subsided and had disappeared at the end of seven days. Return of these symptoms was not noted in the subsequent four months, during which time the animal remained well.

Ocular reactions with killed cultures and filtrates

In order to throw light on the nature of the ocular reactions, and on the rea-

son for elective localization, a series of experiments was done with suspensions of killed streptococci and the corresponding filtrates^{13, 16}. Of these the following experiments will suffice to illustrate the results obtained.

Two suspensions of a density of approximately 100,000,000,000 organisms in each cubic centimeter of glycerin (2 parts) and 25 percent salt solution (1 part) which had been preserved in the ice box were used. One suspension contained one strain of streptococcus that had caused lesions in the eyes of rabbits on intravenous injections and which had been isolated originally from the uterine cervix of a patient with iritis; the other contained eleven strains of streptococci that had caused hemorrhages or ulcer of the stomach on intravenous injection, and which had been isolated from foci of infection or excised ulcers of patients with gastric or duodenal ulcer. These suspensions were diluted with distilled water so that 1 cc. of each, represented approximately 30,000,000,000 streptococci, representing the growth from about 15 cc. of broth. The dense glycerin-salt solution suspension of the streptococci derived from patients with iritis had been preserved in the refrigerator for two and a half years, and the component suspensions of the streptococci from patients with ulcer, from six, to two and a half years. The streptococci were killed by adding one part of chloroform to thirty parts of the suspension, shaking repeatedly, and allowing the mixture to stand at room temperature for twelve hours. The filtrates were prepared from suspensions of equal density in water saturated with ether. The chloroform and ether were removed before injection by bubbling air through the suspensions and placing them in a vacuum for a short time. Portions of the diluted suspension, of the filtrate, and, for control purposes, of the corresponding dilution of the glycerin-salt menstruum treated in like manner with chloroform or ether, were injected, at as nearly the same rate as possible. The portions injected were 0.5 cc. for each 100 gm. of body weight. Rabbits which weighed from 1,500 to 2,000 gm, re-

ceived intravenous injection and some of the guinea pigs which weighed from 400 to 600 gm. received intravenous and intraperitoneal injections, and others received either intravenous or intraperitoneal injection. Cultures of the material injected proved sterile in all instances. None of the animals died, and the blood from all that were chloroformed twenty-four hours after injection remained sterile. Leukocytic counts of the blood before, and three hours after injection, in both series of experiments, remained about the same. There was usually a rise of temperature of from 1° to 2°F. three hours after injection, but it was normal on the following day. The respirations were sometimes moderately increased for from fifteen to thirty minutes following injection, and about equally for the two suspensions, but the animals which received the suspensions of organisms derived from patients with ulcer gave signs of greater illness during six to twelve hours after injection. Comparable results were obtained with like suspensions made on four occasions over a period of one month.

Four rabbits and three guinea pigs were given injections, respectively, with chloroform-killed streptococci derived from patients with iritis and ulcer, and for control, with the diluted chloroform-treated menstruum. One guinea pig, which received injection of streptococci derived from a patient with iritis failed to give evidence of ocular reaction. All of the remaining animals revealed moderate or marked reactions in both eyes (fig. 3). In several, marked congestion and deposit of fibrin in the iris, associated with moderate clouding of the aqueous humor, developed. In only one of these animals, a rabbit, were a few small hemorrhages of the duodenum revealed. In the rest, there were no lesions of the stomach, duodenum, or other viscera. Two of the rabbits which received streptococci derived from patients with ulcer revealed slight, and one rabbit revealed marked, reactions in both eyes, whereas one rabbit, and all of the guinea pigs remained free from ocular reaction. All but one animal, a guinea pig, revealed lesions of

the stomach and three revealed lesions of the duodenum in addition. No lesions attributable to the injection were found in other viscera.

Only one of the rabbits in the control group revealed slight congestion of the eyes. In the remaining animals there were no ocular manifestations, and none revealed lesions in the stomach, duodenum, or other viscera.

The filtrates of the corresponding suspensions of streptococci killed in ether-water, and of the control ether-water-treated menstruum, were injected respectively in two rabbits and two guinea pigs. Slight to moderate reactions of the eyes occurred in the four animals that received injections of the filtrate of the suspension of streptococci that were derived from a patient with iritis, and no lesions of the stomach or duodenum were found after death. Slight congestion of the eyes occurred in only one of the four animals, a rabbit, which received the filtrate of the suspension of streptococci that were derived from patients with ulcer. Both guinea pigs and one of the rabbits had hemorrhages of the stomach or duodenum. The four controls, which received the filtrate of the ether-water-treated menstruum, did not reveal ocular reactions during life and no lesions of the stomach or duodenum after death. Thus, of eleven animals which received suspensions of killed streptococci derived from patients with iritis or which received a corresponding filtrate, ten (90 percent) revealed the primary ocular reaction in varying degree and only one (10 percent) slight lesions of the stomach or duodenum. Of the eleven which received suspension of killed streptococci derived from patients with ulcer or which received the corresponding filtrate, three (27 percent) revealed slight and one (10 percent) marked ocular reaction, and nine (82 percent) revealed lesions of the stomach or duodenum.

Only one rabbit of the control group of eleven animals had slight ocular reaction and none had lesions of the stomach or duodenum.

Three of the rabbits and one of the guinea pigs received two injections (twenty-four hours apart) of suspen-

sions of streptococci derived from patients with iritis. Two rabbits and two guinea pigs received the filtrate, and, twenty-four hours later, a suspension. The ocular reaction was identical or slightly more marked after the second injection in each instance. Two rabbits and two guinea pigs received a filtrate, and twenty-four hours later the suspension of streptococci derived from a patient who had ulcer. Slight ocular re-



Fig. 3. Ciliary processes of a rabbit that was injected intravenously with the chloroform-killed streptococci from iritis. Moderate leukocytic infiltration, marked hemorrhage and diplococci in an area of hemorrhage may be noted (hematoxylin and eosin, x100; Gram, x1000).

action occurred only in one rabbit following the second injection. Two rabbits and two guinea pigs were given injections twice, twenty-four hours apart, as controls, of the diluted glycerin-salt solution menstruum treated with chloroform. The ocular reaction was not seen in any.

Another series of experiments, in which like dosage was given, was done with a fresh suspension in glycerin-salt solution of three strains of streptococci derived from patients who had iridocyclitis, one representing the strain iso-

lated from a pulpless tooth, one that was isolated from the uterine cervix and one that was isolated from pyorrheal pockets. Both of two rabbits that were given intravenous injection with the unheated suspension of living streptococci and all of four that were given injections of the corresponding heat-killed suspension (60°C. for one hour) had the typical ocular reaction in varying degrees. Filtrates of glucose-brain-broth cultures of two strains that proved to have specific ocular effects gave similar, although less marked, ocular reactions on intravenous injection.

The streptococcus

The strains of streptococci that possessed specific affinity for the eye and which were isolated from patients with each of the different, yet closely related, diseases of the eye, were much alike. All produced small, dry, nonadherent colonies on blood-agar plates prepared by adding 5 percent of citrated blood from the horse to the usual meat-extract-peptone agar. The colonies of most strains were surrounded by a narrow, greenish zone of partial hemolysis, with no hemolysis peripheral to this. A few strains were encountered in which there was considerable clear hemolysis peripheral to a primary greenish zone of partial hemolysis. A small number of strains had no noticeable effect on the blood in blood-agar plates. In no case were streptococci isolated that produced marked and clear hemolysis beginning immediately surrounding the colony. Temporary changes in the three types of colonies produced by different strains depending mostly on the age of a given culture, and on passage through animals were not uncommon. However, only few acquired marked hemolytic power when grown on artificial media. In liquid media, such as glucose-brain broth, glucose broth, and meat infusion broth, the different strains usually produced diffuse growth, with slight granular sediment. Stained films revealed noncapsulated, gram-positive diplococci of equal size, somewhat smaller than, but resembling, pneumococci in shape, and mostly in chains of short to me-

dium length. Practically all of the strains were sensitive to oxygen in the primary culture, and some extremely so, but after culture in a liquid medium such as glucose-brain broth affording a reduced oxygen tension, they usually grew aerobically. The use of media affording reduced oxygen tension is therefore essential for isolation of the organisms, especially those from uncontaminated foci; such foci are the apexes of infected teeth and the affected eyes of rabbits following intravenous and other methods of injection of cultures. Moreover, aerobic cultivation tends to destroy promptly the properties on which elective localization depends. A single aerobic plating on blood-agar usually suffices to destroy elective localizing power, whereas, in partial-tension mediums, such as glucose-brain broth or glucose-brain agar, it may be preserved for many culture generations; however, even under such circumstances, subcultures cannot be made as often as four to six times in each twenty-four hours, in previously warmed mediums. The mediums which have given the best results in our hands in this study, as in other studies of elective localization, were glucose-brain broth and glucose-brain agar. The glucose-brain broth consists of 0.2 percent dextrose broth which is placed in tall test tubes (1.5 by 20 cm.). To each tube is added approximately 3 gm. of calf brain, and to maintain the titer of pH 7.0, several small pieces of marble are also added before the medium is autoclaved in the usual way. The glucose-brain agar is made in the same way, except that 0.7 per cent agar is added to the broth. The column of medium, as used, should not be less than 10 cm. in height. Growth in the glucose-brain broth usually begins at the bottom, surrounding the pieces of brain, and then rapidly extends to the top.

Fermentative power of sugars of the different strains which have elective localizing power is variable. The chief means of identification has been the specific localizing power following injection of animals. Since streptococci which have respective elective localizing power, and which have been iso-

lated from patients who have arthritis or encephalitis, have been shown to possess characteristic cataphoretic potential,²⁴ we are studying the strains from patients with uveitis and other infective diseases of the eye from this standpoint. The preliminary results indicate that this method will prove of value in the study of this problem, and perhaps will take the place of the more elaborate and difficult method of inoculation of animals.

Illustrative cases

Case 1. The patient, a railroad repair man, aged fifty-nine years, entered The Mayo Clinic in October, 1928. Twenty-five years before, his right eye had been removed because of a traumatic injury. He complained, on entering the clinic, of having seen floating objects in the field of vision of the left eye for four weeks. This condition came on rather suddenly and without pain.

Examination revealed defects in the nasal portion of the visual field, many coarse, floating, opaque particles in the vitreous, and general haziness of the vitreous humor. A diagnosis of hyalitis and uveitis was made at this time. Examination also revealed three infected teeth and prostatitis of marked degree. The teeth were extracted and the prostatitis was treated. By the middle of December vision had improved, but it became worse again later in the month, and examination revealed a detached retina. The patient was hospitalized for six weeks, during which time, under treatment, the general condition of his eyesight was moderately improved. He was then dismissed, and was asked to report in two or three months, but he never returned.

Cultures in glucose-brain broth, from the three teeth, yielded a pure growth of green-producing streptococci, large numbers of colonies of streptococci in glucose-brain agar, and no growth on aerobic blood-agar plates. The primary cultures in glucose-brain broth were pooled; one rabbit was given intravenous injection of 0.5 cc. for each 100 gm. of body weight, and two rabbits were given injection in the lower jaw, through the mental foramen, of 1 cc. of

the culture concentrated five times. In all three animals circumcorneal congestion, photophobia, and lacrimation developed, and in two there was clouding of the aqueous humor in addition. The primary culture in glucose-brain broth, from the involved eye of one of these, was injected into six rabbits. Two received intravenous injections, and in both, mild ocular reactions developed. One was given an injection in the lower jaw, through the mental foramina, with 1 cc. of the culture, concentrated five times. Marked circumcorneal congestion developed but the aqueous humor remained clear. The animal died, forty-eight hours later, with symptoms resembling meningitis. Necropsy revealed meningitis, most marked around the optic commissure, clear aqueous humor that proved sterile, cloudy vitreous humor in which diplococci and leukocytes were found in large numbers and from which streptococci were isolated. The spinal fluid was turbid and yielded large numbers of streptococci.

Three rabbits were given injections in the marrow of both tibias, with 2 cc. of the culture concentrated five times. In two of these marked, circumcorneal congestion, photophobia, and lacrimation developed, and in one, moderate similar manifestations appeared. In one, these reactions subsided without clouding of the vitreous humor as recovery ensued. In the other, the aqueous humor and the cornea became cloudy, and continued cloudy until the fourth day. On the morning of the fifth day the animal was found dead. Necropsy revealed hemorrhagic infiltration and exudation surrounding the optic nerves and commissure, slight infiltration of the periosteum of the tibias about the point of injection, and turbid cerebrospinal fluid from which large numbers of the streptococci were isolated. The blood and pipettings from the marrow of the tibias proved sterile. In the third rabbit, marked circumcorneal congestion developed in both eyes within one hour after injection. This had grown extremely marked and was associated with marked clouding of the aqueous humor in the right eye by the following day. The condition of the left eye

remained stationary, and the aqueous humor was clear. The condition of the eyes remained about the same throughout the following day as increased res-

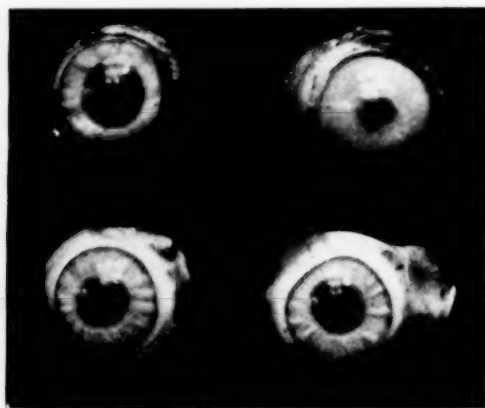


Fig. 4. Eyes of a rabbit (above) in which marked iritis and uveitis developed forty-eight hours after an intratibial injection of the streptococcus from the involved eyes of a rabbit that was likewise given injection with the streptococcus from a pulpless tooth from a case of acute iritis. Marked circumcorneal congestion and hemorrhage of both eyes, and marked clouding of the fluid and exudation in the anterior chamber in addition, in the right eye, and the absence of these in the eyes of a normal rabbit (below) photographed as controls.

piration developed. The animal was found dead the morning of the third day. Necropsy revealed marked circumcorneal congestion of both eyes (fig. 4), clear aqueous humor and cloudy vitreous humor, in which leukocytes and diplococci were found, turbid aqueous and vitreous humor, and cloudy exudate over the iris of the right eye, and turbid cerebrospinal fluid, smears of which revealed leukocytes and streptococci. Cultures from vitreous humor of both eyes and from the aqueous humor of the right eye, from the spinal fluid and from the blood, yielded pure cultures of streptococci.

Sections of the left eye revealed leukocytic infiltration and edema of the outer layer of the choroid posteriorly, a normal ciliary body and a normal iris. Sections of the right eye disclosed marked diffuse and localized leukocytic infiltration of the iris, ciliary body and choroid, and many streptococci and

diplococci in the regions of infiltration (figs. 5, 6 and 7).

The primary culture from the right eye of this rabbit was injected into the tibias of two additional rabbits. In both marked, typical ocular reactions developed. One died of meningitis forty-eight hours after injection. In the other, marked symptoms of spasmodic torticollis developed as the reaction in the eyes subsided. This condition, over a period of two weeks, gradually changed to a continued torsion spasm of the muscles of the neck, at the end of which time the head had rotated 45° to the right. The animal tended to roll over, always to the right, and rhythmic movements of the head synchronous with horizontal nystagmus had developed. This condition changed markedly



Fig. 5. Marked localized necrosis, hemorrhage, edema, and leukocytic infiltration in the iris and ciliary body of the right eye of the rabbit represented in figure 4 (hematoxylin and eosin, x85).

during the succeeding two days when it drew its head sharply backward as it sat quietly in the cage. It died one week later from infection of *Alcaligenes bronchisepticus* introduced by the bites of another rabbit.

Case 2. A physician, of middle age, had posterior uveitis with vitreous opacities. Two pulpless teeth were removed under sterile precautions, February 5, 1929. There has been no recurrence of the ocular condition since. A pure culture of green-producing streptococci was isolated in glucose-brain broth, and in large numbers in glucose-brain agar, from the apex of both teeth. Like cultures on aerobic blood-agar plates remained sterile. The primary cultures in glucose-brain broth were mixed and injected into rabbits. In the one rabbit that received 10 cc. of the unconcentrated culture intravenously, marked circumcorneal congestion and moderate photophobia developed, but it disappeared the following day. The rabbit was then given an

and injection, a third intravenous injection of this strain was given, in the third subculture after one animal passage. The animal passage consisted of



Fig. 6. Choroid coat, sclera and retina of the right eye of the rabbit represented in figure 4. The marked localized area of infiltration by leukocytes in the outer layer of the choroid, and the marked swelling of the retina and marked edema between the choroid coat and retina may be noted (hematoxylin and eosin, x85).

injection with the second subculture. A less intense ocular reaction followed, but this disappeared first after three days. On the fourth day after the sec-

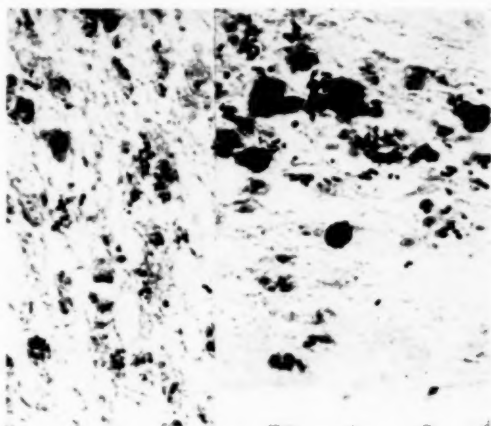


Fig. 7. Diplococci in the affected tissues of the eye shown in figures 5 and 6: *a*, in the iris; *b*, in the choroid coat (Gram stain, x1000).

the following procedure: the streptococci derived from the patient's teeth were injected into the jaw and tibia of a rabbit; choroiditis developed as a result, and the organism was isolated from the cloudy fluid in the posterior chamber of the rabbit's eye. Only slight ocular reaction occurred, and the animal remained well for three months, the period during which it was under observation. A second rabbit was given an injection in the tibia with like amounts of the streptococcus from these cultures concentrated four times. The ocular reactions were more severe and lasted longer, but clouding of the aqueous humor did not develop and the animal remained well subsequently. A third rabbit was given an injection in the lower jaw with 1.2 cc. of the primary culture concentrated four times. Moderate ocular reaction developed in two hours, and was present twenty-four hours later. When 1 cc. of a like suspension of the second subculture was injected into the marrow of the tibias, marked reaction of the eyes developed within one hour after injection and lasted for at least twelve hours, without the aqueous humor becoming cloudy. The animal was found dead the

following morning. Necropsy revealed clear and sterile aqueous humor and turbid vitreous humor in which leukocytes and diplococci were found, and



Fig. 8. Posterior part of the eye of a rabbit injected into the tibia with the streptococcus from a case of uveitis with vitreous opacities; marked infiltration and edema of the choroid coat and marked hemorrhage, necrosis, and infiltration surrounding and in the sheath of the optic nerve may be noted (hematoxylin and eosin, $\times 45$).

from which pure cultures of the streptococcus were isolated. The spinal fluid was turbid and contained many leukocytes and streptococci. An exudate was found surrounding the optic nerves and commissure, in which, also, large numbers of leukocytes and streptococci were demonstrated. Cultures from the blood and from the bone marrow of the tibias yielded the streptococcus in moderate numbers. There were no lesions of the viscera, and the cultures from bile and kidneys were sterile. Sections of the eyes revealed marked edema and leukocytic infiltration, numerous streptococci in the choroid of the posterior part of the eye, and in the sheath of the optic nerve (figs. 8 and 9) and absence of infiltration,

hemorrhage and bacteria in the ciliary body and iris.

Two rabbits were given injections in like manner, as controls, with uninoculated glucose-brain broth, with negative results. One week later these rabbits received the third subculture of the growth of the streptococcus from the fluid in the posterior chamber of the eye of the rabbit in which choroiditis developed. In both, circumcorneal congestion developed. The one that received intravenous injections recovered and remained well. The one that was given an injection into the tibia died twenty-four hours later. Necropsy revealed numerous hemorrhages in the sigmoid, clear and sterile aqueous humor but cloudy vitreous humor, in which leukocytes and diplococci were found, and from which, as well as from the blood, the streptococcus was isolated in pure culture.

Case 3. A married woman, aged thirty-six years, entered The Mayo Clinic in December, 1924, stating that she was gradually losing her sight, that excessive eye strain caused aching of the eyeballs, followed by violent headache, that she was subject to frequent colds, and that also she had some arthritis.

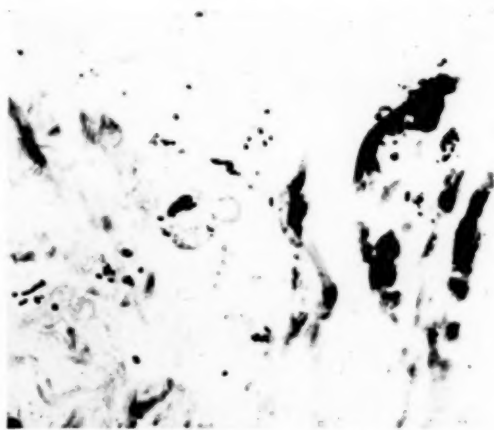


Fig. 9. Diplococci and streptococci: *a*, in the sheath of the optic nerve; *b*, in the choroid coat shown in figure 8 (Gram stain, $\times 1000$).

General examination revealed recurrent, disseminated choroiditis, several infected teeth and possibly injection in the tonsils. Because of the numerous in-

fectured teeth she was advised to have all of the upper teeth removed. She returned to the clinic six months later with new areas of choroiditis in the right eye, and was again urged to have all foci of infection eradicated; vision in the right eye was completely gone, and that of the left eye was blurred. By the middle of July, 1925, all infected teeth and the tonsils had been removed, and she was using an autogenous vaccine. Word was received from her husband, the latter part of July, that she was improving daily and that the vaccine was being used as directed. She wrote that her right eye was decidedly improved. Examination revealed no evidence of active involvement or recent activity in either eye.

Three teeth were extracted at the clinic. The apex of each tooth yielded a pure culture of streptococci in glucose-brain broth, large numbers of colonies of streptococci in the deeper layers of glucose-brain-agar shake cultures, and no growth on blood-agar plates. Each of the primary cultures in glucose-brain broth was injected intravenously into two rabbits. One culture produced no discernible result in rabbits. Each of the other two produced lesions in the eyes of one of the two rabbits that received injection. The strain isolated from an eye of one of these rabbits was reinjected into two other rabbits, and it produced lesions of the eyes of both. All rabbits were given intravenous injections of approximately 0.5 cc. of the glucose-brain-broth culture for each 100 gm. of body weight, on two successive days. Cultures from the blood and joints were usually sterile, whereas cultures from the pipetted material from involved eyes contained the streptococcus in pure culture.

Case 4. A woman, aged twenty-nine years, had had marginal keratitis of one of her eyes since July, 1925. Since the age of sixteen years, a discharge from the uterine cervix had been present, which could not be associated with exacerbations of the eye.

Repeated cultures from the uterine cervix yielded a green-producing streptococcus which caused marked, acute

circumcorneal and episcleral injection in rabbits. Following dilatation of the cervix and curettage of the uterus, and the use of an autogenous vaccine, the patient was relieved temporarily, but following resection of the cervix in the autumn of 1927 the condition of the eyes improved gradually and the patient is now practically well.

Cultures from the cervix made at intervals from July, 1925, to January, 1927, were injected into animals. Altogether sixteen rabbits and one white rat were given injection. Lesions of the eyes developed in the rat and in eight of the rabbits.

Comment and conclusions

Clinical evidence of the etiologic significance of foci of infection in uveitis has been reported and emphasized by many, notably by Benedict and his associates^{1, 2, 3}. We have observed striking curative effects, especially in some cases following removal of foci¹⁷ in which we proved the presence of the streptococcus having elective localizing power, and following the use of autogenous vaccines²³ prepared from the streptococcus isolated from involved eyes of rabbits that had received injections. Dismal failures have also been noted in some cases in which this latter procedure had no apparent effect. In no case have we observed harmful effects. The streptococcus having elective localizing power has been isolated with about equal frequency from different foci, such as tonsils, teeth, prostate gland and uterine cervix in cases of uveitis, and in some cases from several of these foci and from the nasopharynx simultaneously. Since the specific streptococcus in cases in which patients are suffering from active symptoms has been demonstrated to be present in different foci and on the mucous membrane of the pharynx and even in the stool in some instances, not too much should be expected from the removal of a particular focus in individual cases. Demonstration of the streptococcus in foci in some cases, on repeated occasions over a period of several years, and in the depths of the jaw surrounding the apexes of pulpless

teeth, indicates that the serum or tissue juices of patients who suffer from development of infective diseases of the eye provide the very conditions favorable for streptococci that generally are present in these regions to acquire affinity for the eye.

That removal or elimination, by non-surgical means, of foci, so far as possible, with or without the use of autogenous vaccines, often results in spectacular cures, and in prevention of attacks, and although of fundamental importance is not, however, sufficient to solve the problem. More is required such as specific treatment with an antiserum. Since the streptococci isolated in the different cases are much alike, and since the different strains which have elective localizing power in other diseases have been shown to be immunologically fairly homogenous¹⁹, and thus perhaps amenable to treatment with antisera, it is hoped that this same effect will be seen in cases in which streptococci that have affinity for the eye are concerned. A hyperimmune serum has been produced in a horse which is now being used to type the different strains by means of agglutination and precipitin tests, and serum potential measurements. The effect of the serum of patients on the strains which have elective localizing power is also being studied in the hope of proving still further the etiologic relationship of the streptococcus. The hyperimmune horse serum and the serum from patients who have acute iritis

have already been shown to possess specific agglutinating power and serum potential lowering effects over the homologous and several heterologous strains.

Each of the several conditions as they occur spontaneously in man have been accurately reproduced or closely simulated following various methods of inoculation of the streptococcus, including the production of foci of infection in teeth or in bony cavities. Thus, examples of pure iritis, of cyclitis, of choroiditis, and of various combinations of these and the associated conditions have been successfully produced. The streptococcus has been demonstrated in the lesions even when the dead organisms have been injected and it has been isolated from the lesions and the disease reproduced after one or more passages through animals.

Elective localization of this streptococcus or its toxins has been obtained in a sufficiently high percentage of animals, in a large enough series of cases, by methods sufficiently variable, and with conditions sufficiently like those at hand in patients, to be of significance. The dead streptococcus and filtrates of culture that manifested elective localizing power also had specific affinity for the eye, causing typical ocular reactions. The most important requirements for causal relationship of this streptococcus to uveitis and other intra-ocular diseases of the eye have been fulfilled.

The Mayo Foundation.

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Discussion: DR. GOUTERMAN: Is experimental iritis due to a toxin or to bacteria or to both? Were streptococci recovered from experimental cases of iritis to prove Koch's Law?

DR. NICKEL: We have found that the bacteria, or the toxin alone, or both, can be the cause. We have tried to see if we could find an organism when we injected the toxin. We could not find it. When we injected the toxin we got a short reaction. In cases of definite iritis in animals induced by injection of the living bacteria we can recover the organism by culture. But, one cannot get it by pipetting the fluid from the anterior chamber and streaking it on a plate. The organism will grow only on proper media. The organisms we wished to study were injected into a rabbit. We reproduced the lesion. We recovered the organism. We reinjected and again produced the lesion. We can do that three or four times and then

for some reason or other it disappears and loses its specificity. That is as far as we have gone, except that we have determined immunologically that the strain will be agglutinated by the patient's serum, if the patient has had sufficient reaction. We have gone as high as one part to 1,200.

DR. HOLLOWAY: Was any attempt made to desensitize the experimental animals after inoculation?

DR. NICKEL: I do not think that Dr. Rosenow tried to desensitize them.

DR. PARK LEWIS: Will you explain in fuller detail the method of determining the cataphoresis phenomena?

DR. NICKEL: Bacteria, as all other colloidal particles, carry electric charges. They migrate toward the positive pole because they are negatively charged. The higher the charge or potential, the more rapid the migration. The rate of migration in the Northrup-Kunitz-Mudd cataphoresis cell is determined

with a stop-watch by noting the time it takes for the organisms to migrate a distance of 32 microns, under a constant electric current and other controlled conditions, such as temperature, character of distilled water, cleanliness of glassware, and so forth. The organisms are grown for eighteen to twenty-four hours in glucose-brain broth. The growth from 2 cc., after thorough centrifugalization and decanting of the supernatant broth, is suspended in 12 cc. of distilled water, poured into the apparatus and the time it takes for from ten to twenty of the organisms to travel the unit distance of 32 microns, is determined in seconds and tenths of seconds. As reported by Rosenow and Jensen, the streptococci from foci of infection in chronic infectious arthritis migrate 10.6 microns each second, those from chronic encephalitis 8.0 microns each second, and the majority of those in the relatively few strains tested thus far from foci in patients having iritis or uveitis migrate 12.8, 11.4 and 10.6 microns each second.

DR. DERBY: Are the strains of the streptococci that cause any one lesion constant enough in their various characteristics to permit of using a stock vaccine prepared from a uveitis case, in all cases of uveitis?

DR. NICKEL: In essence, no. In the majority of cases the stock vaccine may be of help. The isolated strain is put on an ordinary medium. Nine chances out of ten the specificity is lost in the second culture. Rosenow states that it

must be made as fast as possible, in the most suitable medium. We thought of using the bottles and immunized corks. We thought we were doing finely, but when this cataphoretic idea came up we took the strains that we had grown in the bottles and in some instances we found that they had lost their value. I do not know where along the line it left, but it was gone.

Summing it all up we do not know yet how to make a good vaccine. That is the whole trouble. If we did know we might be on the right track. We feel that the best way to do is to take the individual strain, if one can get it, make the vaccine and use it. If we cannot get an individual strain, then we have a vaccine made as promptly as we can make it, of fifty or a hundred strains from cases similar to those of the patient's condition. We substitute that for the stock vaccine. Each patient is a case unto himself. The dose has to be graded according to the patient. One cannot arbitrarily give him a tenth of one cc. or two-tenths. One patient may require 1/20 cc. to give a marked reaction while for another it might be necessary to dilute the vaccine. In still another patient it might be possible to give a whole cc.

DR. GOAR: Have organisms been recovered from the human eye in cases of alleged iritis, from focal infection?

DR. BENEDICT: Yes, organisms appear in the aqueous in certain cases of severe iritis in humans.

CONSIDERATIONS UNDERLYING THE EXPERIMENTAL PRODUCTION OF UVEITIS

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Attention is called to the difference between producing, experimentally, isolated inflammations of the uveal tract and recurring uveitis. The literature on the subject is briefly reviewed. Several series of experiments are reported in which eyes were sensitized by injecting various antigens into the anterior tissues of the eye and attacks of uveitis were produced upon introducing the same antigen into other parts of the animal several days later. From the Children's Hospital Pediatric Research Foundation, Cincinnati, Ohio, aided by a grant from the Schmidlapp Foundation. Read before the Association for Research in Ophthalmology, Philadelphia, June 9, 1931.

Syphilis, tuberculosis, and sympathetic uveitis have been fairly extensively investigated as they concern the etiology of chronic uveitis. The so-called nonspecific cases with which this paper deals and which comprise a large group, have been little studied experimentally.

The method used to produce acute iritis depends on the question to be studied. Direct injection of organisms into the anterior chamber will usually produce the condition. This connotes nothing except that the combination of trauma and organisms was effective. Organisms injected into the carotid, if pathogenic and in sufficiently heavy suspension, often lodge in clumps in the smaller vessels and produce acute iritis. Koske¹ caused an inflammation by the injection of living *B. subtilis*, *prodigiosus*, and *staphylococcus* into the anterior chamber of rabbits. Stock² observed an iritis followed by a choroiditis after the intravenous injection of yeast. The well known experiments of Guillery³ demonstrated that a uveitis could be caused by the intravenous injection of the filtrates of ferment-producing bacteria. At first he associated his results with sympathetic uveitis because he saw a similarity in the pathologic changes. He⁴ later modified his assertion concerning this relationship but claimed that the filtrates of certain ferment-producing bacteria had a toxicity for the uveal tract. Woods⁵ confirmed this by the intravenous administration of a very toxic substance he obtained from cultures of *B. prodigiosus*. Rose-now⁶ has produced acute iridocyclitis by the intravenous injection of strepto-

cocci. Thus, acute inflammation of the uveal tract has been produced by the *lodgment in the eye* of bacteria or some toxic substance introduced through various body channels.

The experimental production of *recurrent uveitis* is quite another matter. Many added factors and sources of error are introduced. The acute inflammation caused by the injection of a fairly heavy suspension of organisms through any route usually results in panophthalmitis which destroys the eye. An animal may acquire a septicemia and die before any observations can be made. Single or multiple foci may be set up, so influencing or changing the reaction that the results are worthless. The effects of trauma may distort the reactions. The basic consideration for the study of recurrent uveitis is a method of producing a primary attack which will not destroy the eye by massive infection or occasion trauma that will interfere with observations.

Ocular sensitization has often been produced experimentally by various methods and to various proteins. Nicolle and Abt⁷ immunized guinea pigs by intraperitoneal injections of serum and produced ocular inflammatory symptoms by an injection of horse serum into the anterior chamber thirty-two days later. Krusius⁸ caused a general sensitization in guinea pigs by intraocular injection of cow serum. He later produced anaphylactic death by intracardiac injection of the same antigen. He also sensitized animals to cow serum by subcutaneous injection and produced ocular inflammation by subsequent anterior

chamber injections. Kummel⁹ sensitized one eye and injections in the second eye caused inflammatory reactions in the second eye. Wessely¹⁰ sensitized rabbits by corneal injections of heterologous serum. The immediate reaction subsided shortly and in fourteen days a pericorneal injection appeared. This reaction subsided and fourteen days later the cornea of the second eye was injected with the same serum. This produced a violent interstitial keratitis which Wessely called "keratitis anaphylactica". These findings have been confirmed by other observers. Woods¹¹, in order to avoid the deleterious action of foreign protein itself and trauma on the eye, sensitized animals by intraperitoneal injection of foreign protein. He perfused the animals' heads with the same antigen and produced primary contraction of the pupil followed by further gradual contraction and small hemorrhages in the fundi.

Wibaut¹² reported before the Netherlands Ophthalmological Society in 1919, experiments with the introduction of foreign protein, particularly horse serum, which he injected into the vitreous chamber of a rabbit and then repeated this in thirteen days. He found that twenty-four hours later a violent reaction had been produced. This consisted of an intense ciliary hyperemia with dilatation of the blood vessels of the iris and exudation into the anterior chamber. Microscopic section showed enormous infiltration into the uveal tract consisting mainly of polymorphonuclear leucocytes. This subsided and was repeated in lesser degree by subsequent injections. Seegal and Seegal¹³ recently reported what they term an ocular anaphylaxis by the injection of egg white and foreign erythrocytes into the anterior chamber of the rabbit eye. On the fourteenth day they gave the sensitized rabbit an intravenous injection of the same protein and produced marked ocular redness, lacrimation, and dilatation of the blood vessels of the iris. Daily injections with the specific antigen were accompanied by the gradual reduction in the resulting reaction with eventual cessation of all

local response. In 1929, Dummer and I¹⁴ attempted the sensitization of ocular tissues by the subconjunctival injection of suspensions of killed organisms. The results of subsequent intravenous injections of the same antigen were negative.

A comparison of the methods used to produce ocular sensitization indicated that intraocular placement of an agent was necessary. Apparently the conjunctival circulation disseminated the material quickly or the sclera and cornea protected the intraocular tissues from primary sensitization. The failure may lie in the response to different methods of administration. Julianelle¹⁵ found that rabbits injected intravenously with heat-killed pneumococci develop highly specialized, species-specific antibodies for other strains. When the same typed vaccines are injected intracutaneously, only semispecialized or species-specific antibodies are formed, the type-specific agglutinins being completely absent.

All extraocular means seemed too haphazard to produce local results that could be unquestioned. Therefore, injection into the cornea about 2 mm. within the limbus with a small needle (30 gauge) was the method employed. The fellow eye of every animal injected was punctured with a similar sterile needle and an equal amount of sterile physiologic salt solution was injected for control. In every instance the control eye cleared in not more than twenty hours afterward with a small dot as the only evidence remaining in some cases.

We first wished to test the validity of the idea that intraocular sensitization could only be produced routinely by the intraocular presence of the sensitizing medium. The results of Seegal and Seegal were confirmed. Egg white and foreign erythrocytes (guinea pig) each produced typical ocular anaphylaxis when introduced into the anterior chamber of rabbits' eyes, followed by intravenous injection ten days later. Similar injections subconjunctivally were without avail. Vitreous chamber injections were effective but not as markedly positive as anterior chamber injections.

Our chief interest was the possibility

of similar action of organisms, so a strain of hemolytic streptococcus, recovered from an infected tooth root of a man with uveitis was cultured in brain agar. A dilute suspension in sterile water (.15 cc.) was injected into one anterior chamber of each of three rabbits. The procedures were performed under ether anesthesia because the animals were thus easily held quiet and a minimum of trauma produced. There was an immediate inflammatory reaction close to the site of injection. This disappeared in from five to six hours. A quiet period followed and in about twelve hours after the injection the pupil was noticeably smaller than in the fellow eye. The eye punctured in a sterile manner had become entirely quiet by this time and remained so. In fourteen to forty-eight hours a mild iritis was manifested by a blurred iris, contracted pupil, circumcorneal injection and a small amount of exudate in the pupillary margin of each eye. This reaction reached its height in forty-eight to seventy-two hours and then began to subside. In five to six days the eyes were quiet, the pupils had resumed their former size and shape and no exudate was visible. Ophthalmoscopically, nothing abnormal was seen. On the tenth day, 2 cc. of a fairly heavy suspension of the same organism was injected into an ear vein. Five hours later one rabbit had a beginning circumcorneal hyperemia which developed rapidly. Within the same hour the other two presented similar signs and in eight to ten hours the previously injected eyes had manifestations of acute iridocyclitis. There was some lacrimation, injection of conjunctival and ciliary vessels. The patterns of the irises were blurred. The pupils were contracted and irregular and there was some exudate in the anterior chambers. The pupils were dilated with homatropine to allow immediate examination. In two, there were fine floating opacities in the vitreous. One had a small exudate in the periphery. Microscopic section showed this to be in the choroid but no organisms were seen. The sterilely punctured eyes were normal. The acute process

reached its height in from eight to twelve hours after intravenous injection and subsided twenty-four to thirty hours thereafter. There was no hypopyon or disposition to development of panophthalmitis. The fact that all three animals had responded similarly suggested that perhaps the actual presence of the organism in the eye was not necessary after a primary sensitization. The chances were rather remote that organisms from an intravenous injection would find their way to the eye, particularly the specially prepared one, in each case. In this connection the toxin of the streptococcus associated with scarlet fever (Parke-Davis) was used to test the possibilities of toxin sensitization. A solution equal to ten skin test doses was injected into the anterior chamber of one eye of each of two rabbits. Since 1 cc. of solution is equal to 100 skin test doses, .10 cc. was injected. A like amount of sterile water was injected into the anterior chambers of the other eyes. A slight inflammatory reaction occurred immediately after injection of the toxin and persisted for from four to five hours. A much lesser reaction was produced in the control eyes. Ten days later 1 cc. of 1-100 dilution of the stock toxin was injected into an ear vein of each animal. Within four hours the eyes previously injected with toxin showed circumcorneal injection, and slight contraction of the pupils which became more pronounced. In from eight to ten hours marked vitreous opacities were seen. The acute signs reached their height in from eight to twelve hours and slowly subsided. The major signs were gone and the eyes became quiet within eighteen to twenty-six hours. The vitreous opacities persisted and were still present two weeks after the reaction had subsided. Another series of three rabbits was similarly injected with the same toxin and after the first reaction to intravenous injection had subsided, subsequent injections elicited responses which were progressively less marked until they failed.

In another series in which the experimental injections were similar to

the foregoing, the eyes injected with heated toxin did not respond to intravenously injected stock or heated toxin. This would argue that the broth vehicle was not a factor.

The uveal tract was principally affected in all the reactions. The response, however, varied according to the different excitants. The eyes were removed at the height of the reactions they illustrated. Those sensitized by egg white and foreign erythrocytes showed mainly serous exudation, engorgement of the iris, ciliary body, and in less degree, the choroid. There was leukocytic infiltration, especially in the iris and ciliary body, which consisted chiefly of plasma cells and lymphocytes. There was little exudation in the anterior chamber and the cornea and lens were normal. The vitreous was slightly turbid. The retina and optic nerve were slightly engorged and contained a few cells, apparently by migration. The eyes reacting to toxin showed greater cell infiltration of the anterior uveal tract. The infiltration was mainly of polymorphonuclear leucocytes and the same held for the bacterial reaction, only in greater degree. Besides great hyperemia of the anterior uvea there was more massive general cell infiltration. Exudation lined the crypts and there were posterior synechiae. The choroid was more involved and in one there appeared a circumscribed exudate near the periphery.

The foregoing data are summarized to eliminate extensive protocols.

Our aim in these series of experiments has been to further the work related in a previous paper¹⁴ in which was described the production of acute iridocyclitis by the injection of organisms by extraocular methods. Our next endeavor was to develop a method for producing recurrences which would tend to be toxic in character and non-traumatic in effect. Organisms capable of producing the acute disease were not found to produce recurrences when re-injected extraocularly into the same animals nor were initial attacks brought about in other animals by injection with

these bacteria when cultured from the affected uveal tract of living animals or grown with uveal tissue on media. In other words, the virulence of a given organism obtained from the uveal tract could not be enhanced by growing it in or with uveal tissue. Surprisingly enough it seemed in our experiments that such association actually attenuated the virulence. In attacking the problem from the point of view of tissue sensitization, specificity of the antigen was found necessary but the degree of virulence seemed to play no part. The ability of a toxin to sensitize local ocular tissues is significant in that it may be possible for a focus of organisms to eliminate some absorbable substance into the circulation and so sensitize the uveal tract that the recurrences of uveitis might represent periods of hypersensitiveness and the remissions, periods of desensitization. Foods may play a rôle in a similar fashion. We wish at this time simply to state our findings without any attempt at explanation or generalization.

Summary

1. Ocular anaphylaxis has been produced by placement of foreign protein within the eye of a rabbit and by intravenous administration after the sensitizing period.

2. Ocular reaction has been produced after general sensitization by injection into the eye.

3. Certain bacteria have produced a hypersensitiveness so that after the initial infection has quieted, a similar manifestation was reproduced by intravenous administration of the same antigen.

4. An acute inflammation of the uvea was produced by the intraocular injection of a streptococcus toxin. This subsided and recurred after the intravenous injection of the same toxin ten days later.

Acknowledgement is made to Mr. C. Dummer, for the bacteriological technique.

Doctor's building.

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A STUDY OF SYPHILIS IN THE ETIOLOGY OF UVEITIS

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The methods by which syphilis is diagnosed or excluded in uveitis cases are described. Clinical, laboratory, and therapeutic measures are employed in the study. In a series of 354 cases of uveitis 5.9 percent were found to have syphilis. Antisyphilitic treatment was distinctly beneficial in one third of these. Read in a symposium on uveitis at the second annual meeting of the Association for Research in Ophthalmology, Philadelphia, June 9, 1931. From the Section on Dermatology and Syphilology, The Mayo Clinic.

This study was undertaken to determine the significance of syphilis in the etiology of uveitis. Retrospective clinical investigation, in an effort to determine the etiology of a disease, may afford only a rough appraisal of the cause. However, there are diseases in which efforts to elicit the etiology must be confined to clinical study. Uveitis is one of these conditions. I shall consider only the relationship of syphilis to uveitis, purposely avoiding any consideration of what constitutes uveitis. I have accepted the diagnosis of uveitis as made by the ophthalmologists, and have directed my efforts toward establishing the existence of syphilis and toward determining its treatment.

A patient suspected of having syphilis is subjected to a series of clinical, laboratory, and therapeutic maneuvers that may entail considerable expenditure in time and effort. The clinical examination includes careful examination of the entire integument for evidence of recurrent lesions, or for evidence of the scars of healed nodules and ulcers. Of particular significance is examination of the palms and soles, and of the genitalia, especially of the posterior aspect of the scrotum, where recurrent lesions may lurk unknown to the patient. Examination of the nervous system, the special senses, the mouth, and the nape of the neck, may often elicit evidence of syphilis. Recognition of the stigmata of congenital syphilis, such as Hutchinsonian teeth, may be of aid. Unfortunately, a diagnosis of visceral syphilis is usually made by exclusion of other factors and by recognition of signs of syphilis elsewhere than in the viscera. A diagnosis of visceral syphilis, therefore, is usually a diagnostic problem in itself, and cannot be expected to help in

the solution of problems of diseases of the eye.

Laboratory examinations include, particularly, serologic tests of the blood and spinal fluid, and a dark-field examination of all suspicious lesions for *Treponema pallidum*, and histopathologic study when feasible. At the present time the serologic status is more satisfactory than it has been heretofore, and less time-consuming. The majority of serologists are agreed that the flocculation tests, such as the Kahn test and the Kline test, are more sensitive, more rapid, and less cumbersome than the complement fixation tests. As a result, thorough serologic study of the blood includes a flocculation test first, which is followed by a less sensitive test, such as the Kolmer or the Noguchi modification of the original Wassermann technique. In the Mayo Clinic, in all cases in which syphilis is suspected, or in which treatment is in progress, the Kahn, Kline, Hinton, and Kolmer tests are done on the same sample of blood, whereas formerly, a series of provocative treatments, followed by Wassermann tests, was given. The knowledge gained by histopathologic examination of excised tissue is usually conclusive, but in actual experience the opportunity for such examinations does not often occur, and therefore does not often aid in diagnoses. If patients are aged less than sixty years, and are suspected of having syphilis, the search is incomplete unless the spinal fluid is examined also. This is particularly essential if the result of the Wassermann or the flocculation test of the blood is negative.

The third method of attempting to establish the existence of syphilitic infection is the therapeutic test, followed by prolonged observation. The disap-

pearance of a group of symptoms or signs following a series of injections of arsphenamine and mercury or bismuth frequently has led to a diagnosis of syphilis. In many instances such diagnoses have been justified. On the other hand, I believe it essential to emphasize the fact that improvement following a series of injections of arsphenamine may be the result of the nonspecific or tonic effect in such diseases as papulonecrotic tuberculids, certain parasitic diseases of the bowel, chronic pyelonephritis, lupus erythematosus, erythema multiforme, chronic uveitis, and vitreous opacities. Therefore, in making deductions concerning the etiology of a disease from the result of treatment of that disease, errors in diagnosis may result. A prolonged period of observation is an outstanding feature of a therapeutic test.

In consuming so much space describing the salient means of recognition of syphilis, I have roughly outlined the method of examination employed in the cases which form the basis of this report, after the diagnosis of uveitis had been made by the ophthalmologist. I wish also to emphasize an elementary fact that although it was possible to demonstrate the presence of syphilis in this group of patients, the fact was not lost sight of that syphilitic patients may harbor in their viscera diseases of nonsyphilitic etiology.

I reviewed the records of 354 cases in which a diagnosis of uveitis had been made by the ophthalmologists at the clinic in the course of the last twelve years. Of the 354 patients, sixty-six were referred to the Section on Dermatology and Syphilology because they afforded positive Wassermann reactions, a history of syphilis, stigmata of congenital syphilis, or because the examining physician suspected or recognized evidence of ocular syphilis. All of these sixty-six patients were subjected to the diagnostic criteria mentioned, in addition to periods of prolonged observation. Twenty-one of them (5.9 percent of the 354) were found to have syphilis besides uveitis. The incidence of syphilis at The Mayo Clinic in the last three years has averaged slightly more than 5 percent.

In these twenty-one cases the disease of the eye was diagnosed as follows: uveitis in eight; uveitis and keratitis in six; uveitis and neuritis in two; uveitis and choroiditis in two; uveitis and vitreous opacities in two, and uveitis, neuroretinitis and choroiditis in one. Studies disclosed the presence of congenital syphilis of the hereditaria tarda type in five cases, neurosyphilis in five, cutaneous recurrent syphilis in three; the diagnosis was made on the basis of conditions found in the eye together with positive serologic tests in eight.

The result of the use of antisyphilitic remedies in the treatment of uveitis was not striking, as only seven of the patients were materially benefited, six were improved, and eight were not helped. Patients with interstitial keratitis derived the most benefit from treatment. The effect of treatment on the syphilis itself was more encouraging than were the results of treatment of the uveitis, for slightly more than half of the patients were successfully treated.

In the course of the last ten years, forty patients with uveitis have been referred to me for nonspecific treatment. None of these was suspected of having syphilis nor was proved to have it. The treatment consisted of neoarsphenamine only, or neoarsphenamine given simultaneously with intramuscular injections of the succinimide of mercury. Forty-six percent of these patients derived definite benefit from the treatment, although in many instances the result was not lasting.

The patients who manifested the most satisfactory response to treatment were those who demonstrated uveitis associated with interstitial keratitis. Whether the syphilis was congenital or acquired made no difference. Likewise the greatest amount of improvement was obtained, as a rule, by patients whose treatment was started early in the course of the uveitis. In none of the cases was a microscopic examination of excised tissue possible.

Summary

From the study of these data, it appears that 6 percent of the patients with

uveitis have syphilis, that treatment for syphilis brings about material improvement in the uveitis in 33 percent, and that it affords slight benefit in an additional 28 percent. The patients with the anterior type of uveitis as a rule respond more favorably. Deductions as to the part syphilis plays in the production of uveitis, based on the therapeutic effect, are hazardous, not only because of the fact that ocular syphilis is notoriously resistant to treatment but because non-specific benefit was derived in 42 percent of a group of patients who had uveitis but did not have syphilis. The incidence of syphilis among patients who have uveitis compares favorably with the

general incidence of syphilis in The Mayo Clinic. Evidence was not found in the literature that the *Treponema pallidum* is the cause of uveitis in the same sense that it is the cause of interstitial keratitis. There are, however, numerous references to syphilis as an etiologic factor in uveitis. It appears that in a small percentage of cases the etiology of uveitis is syphilis, and that antisyphilitic treatment is of benefit in 61 percent of these cases of syphilis. In 42 percent of the cases in which syphilis is not a factor, antisyphilitic remedies are of definite benefit also.

The Mayo Clinic.

INFECTIONS OF THE UPPER RESPIRATORY TRACT IN THE ETIOLOGY OF UVEITIS

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This article is a brief excerpt from an exhaustive discussion of the subject which will be printed in full in the Transactions of the Association for Research in Ophthalmology for 1931. The subject matter is based on a wide knowledge of the literature and on the author's experience with 255 cases with eye involvement. Many cases with proven tuberculosis or syphilis improved only after surgical treatment of sinus conditions. Others had had inadequate operations on the sinuses. Sinusitis is never strictly confined to a single sinus. Chronic sinusitis of long standing may not be curable by operation alone. Read before the Association for Research in Ophthalmology, at Philadelphia, June 9, 1931.

My experience on the rhinological side of this subject convinces me that focal infections in the tonsils and sinuses are far more potent factors in uveal diseases than many had believed up to fairly recently. I shall direct my remarks towards the sinuses as a causative factor in uveal diseases. The tonsils are less in controversy. Their claim is better established. My time is too short for so long a subject as the discussion of both.

I have seen many cases of uveitis diagnosed as tuberculous, and others with lues, unimproved though intensively treated, clear up promptly on nasal treatment, both radical and palliative. I have also seen chronic types of uveitis, long considered in a static or slowly retrogressive state and with serious loss of vision, regain fair and sometimes almost perfect vision after radical surgery on the sinuses. It is an established fact that from 30 percent to 50 percent of tuberculous patients have a concomitant sinusitis. When syphilis is demonstrated in the blood and tuberculosis in the lungs, it is quite natural and quite easy for us to sit back entirely satisfied with the diagnosis. This same fallacy in diagnosis is killing many patients with laryngeal cancer. When syphilis or tuberculosis is demonstrated in the cancer victim, further accurate observation is liable to lag, allowing the disease to cross the lethal line. I see these hopelessly late cases very often, salvaged to death, and with cancer beyond control, and, from the very same mistake, I have seen patients go on to blindness, with a diagnosis of syphilis and tuberculosis, and the real cause in the sinuses overlooked.

Syphilis and tuberculosis and metabolic imbalance, so common in middle and later life, cause a cut down in somatic defense and open the way to bacterial invasion or to the activation of an old dormant focus in the sinuses. Treatment, aimed at breaking through this vicious circle at any point, often relieves the patient for a time, but the most logical procedure, and the most effective, as I have proved over and over again, is to attack the original focus or all foci, if it or they can be located.

In fulminating cases, time is too precious to be wasted on vaccines, tuberculin, protein injections, and local treatment. If other causes are eliminated and the sinuses are suspected, immediate operation is an imperative duty.

Frontal sinus infections practically never affect the uveal tract, but large, diseased frontals with deep supra-orbital extensions may reach the optic nerve. In one patient an optic nerve block was due to empyema of the frontal sinus in which the backward extension of the sinus was in juxtaposition to the optic foramen. Sinusitis is never strictly confined to a single sinus. At least, to some degree, all the sinuses on the same side are affected. One reads in the literature, with some skepticism, of cases with isolated frontal sinusitis or isolated sphenoidal sinusitis and of the exenteration of one or two diseased ethmoid cells, the rest of the sinuses being healthy. As well speak of one or two infected cells in mastoiditis, the exenteration of which would restore the mastoid to normal. No mastoid surgeon would think of removing less than all the cells present, good and bad. When the ethmoid is

broken into, its normal drainage is destroyed and it must be totally removed. The maxillary may play a solo rôle for a time, but soon the infection spreads to the ethmoids and on. Chronic sinusitis is rarely unilateral. One side may completely overshadow the other, but usually the apparently normal side is also the seat of a low grade infection. The anterior ethmoids and frontals rarely cause eye complications, if we except direct extension of pus into the orbital fossa. The danger zone for the optic nerve and for the eyeball is in the posterior ethmoid and sphenoid regions. Clinically we observe greater toxicity here, both in a regional and in a general sense. Maxillary sinusitis of dental origin is prone to affect the eye, but a maxillary involvement as a part of a pansinusitis is much less active in that respect.

Sinusitis varies tremendously in its toxicity, due more to the local and general resistance of the individual than to the nature of the infection. An attack of influenza often marks the commencement of uveal disease. This is significant since influenza is perhaps the most common cause of chronic sinus disease.

Unilateral eye involvement is very significant of a focal cause. Bilateral involvement points more to a general, usually a metabolic cause.

Latent sinusitis is subject to exacerbations known as acute colds, febrile or other, and is often accompanied by toxic symptoms. Then a local examination may reveal an acute lateral pharyngitis (due to an irritating postnasal discharge), inflammatory changes in the choana and slight or marked inflammatory reaction in the posterior, upper ethmoid, areas. It is during such periods that the eye infection is liable to begin. In some, these exacerbations may be so slight that the patient is scarcely aware of them. This latency of the disease may result in its being overlooked and other causes sought to explain the eye lesions. Patients harboring the latent type of sinus disease (it is often a lifetime burden) are usually of low resistance or may even have broken immunity. Local nasal treatment may accomplish considerable im-

provement or even cure of the eye complication. In the rapid or fulminating cases operation is safer. Usually the eye affected is on the side of the most active sinus involvement.

Prolonged and repeated tonsillar infections invariably set up a low grade posterior sinusitis. The removal of the tonsils may cure this and the eye condition as well, but too often the eye is only improved by ablating the tonsils. The same is true of rheumatism and of the toxemia consequent upon diseased tonsils. This sequence in the life history of the infection must be kept in mind and also we must remember that this posterior cell latent type of sinusitis is capable of even more damage than the diseased tonsils. Its presence explains why the removal of diseased tonsils is often so disappointing as a panacea in general toxemia and in uveitis.

I have often wondered why the profession is so loth to admit sinus diseases into the family circle of focal infections on an even footing with tonsillar and dental pathologies. The reason, I believe, lies in the difficulty encountered in proving the eligibility of sinus disease. The tonsils and the teeth can be completely removed. To remove the sinus areas completely, is next to impossible, owing to the topography and to the hazards encountered. My twelve years spent as a general surgeon were fraught with no such technical difficulties in that field as are encountered here. Not all rhinologists have the training or the aptitude to attempt a complete removal of all infection in this field. Not one of them can always accomplish it. There remains, therefore, a large margin of surgical failure which is given the wrong interpretation. If, after the sinus operation, no matter by whom done, the eye fails to improve, the sinuses are excluded as the cause when, as a matter of experience, we know that a poorly or an incompletely done sinus operation increases the infection and maybe the eye pathology as well. We must keep in mind that many of these patients with uveitis have become highly sensitized to their own infection and that in these

sinus removal may do little good. Some come too late and the eye goes on, in spite of all efforts, to complete degeneration. In my experience most of the early cases, when the focus can be removed, recover, sometimes with almost miraculous rapidity, and recurrences are eliminated. If obliterating the sinuses cured the eye for the time, and if recurrence takes place, it is usual to find a blocking of drainage, generally in the sphenoids, to account for it, or some infected cells not removed at operation—or may be the remaining bony walls (orbital and base plate) are the seat of a chronic osteitis.

Pansinusitis, which has been in existence for years, is usually only partially curable, due to a chronic osteitis involving all the bony sinus walls. Particularly is this manifest in the sphenoids where the whole body of the bone may become the seat of a chronic osteitis. These advanced sinus conditions I have been able to palliate to some extent but never to cure. I have seen many recurrent uveitis attacks due to this cause.

Uveitis in its relation to focal infection in the sinuses and tonsils is a big subject and impossible to do much with in the time given. One can only point here and there and touch upon one's own personal experiences and convictions. The experiences of others fortify my own feeling that scientific opinion is veering towards focal infection in the nasal sinuses as one of the not uncommon causes of uveitis. Surgery, as a relief measure, has all but spent itself. I look for very little improvement in that direction. When applied early and before sensitization takes place, and when sufficiently radical and skilfully accomplished, its results are often most gratifying, but in highly sensitized cases and in those with lost immunity, and especially following incomplete surgery, it is often disappointing. In this situation one must look to immunology for help. It is in this little known hinterland of medicine that we should search for the true primary cause of many diseases besides the one under discussion. Immunology, I confidently feel, will some

day fill in the now blank spaces in the picture puzzle. Then with immunity safeguarded we may expect our surgical efforts toward the cure of uveitis and the general toxemias due to focal infection to be more uniformly successful. We may even venture the hope, millennial as it may seem, that surgery, now so helpful in individual cases and so often our only resource, will, some day, like the Spanish Inquisition, have only an historic interest.

In the cases tabulated below, all metabolic, tubercular, and serologic tests have been done and all indicated general treatment tried. All causes, other than upper respiratory tract infection, were excluded before coming under my care. Some of the cases reported, in which I was associated, are taken directly from Dr. Edgar Thomson's paper on "Ocular involvement in sinus diseases," *The Laryngoscope*, St. Louis, July-August, 1928.

TABULATED RESULTS

I. Uveitis—58 Cases

Tonsils and sinuses operated on—12	
Greatly improved	5
Slightly improved	4
Lost vision entirely	3
Sinuses operated on—13	
Greatly improved	9
Slightly improved	4
Tonsils operated on—12	
Greatly improved	9
Unimproved	3
Teeth extracted—4	
Greatly improved	4
Sinuses treated—12	
Slightly improved	3
Arrested	5
Unimproved	4
Refused operation—5	
Stationary	2
Retrogressed	3
Total	58

II. Uveitis—58 Cases

Six cases selected from 43 improved cases to show fair average of visual change after operation on tonsils and sinuses and in one case after extraction of teeth. In all these cases there were remaining vitreous opacities but the vision improved and there was no recurrence.

Case 1	20/200 to 20/20
Case 2	20/200 to 20/40

Case 3	20/100 to 20/30
Case 4	20/70 to 20/20
Case 5	20/40 to 20/15
Case 6	4/200 to 20/200

III. Choroiditis—40 Cases

Tonsils and sinuses operated on—12	
Greatly improved	9
Slightly improved	2
Unimproved	1

Sinuses operated on—8	
Greatly improved	8

Tonsils operated on—3	
Greatly improved	2
Slightly improved	1

Tonsils operated on and treated for lues—1	
Greatly improved	1

Sinuses treated—12	
Greatly improved	7
Slightly improved	2
Unimproved	3

Operation refused—4	
Total blindness	1
Retrogressed	3

Total40

IV. Choroiditis—40 Cases

Six cases selected from 32 improved cases to show fair average of visual change after operation on tonsils and sinuses and in one case after sinus treatment.

Case 1	4/200 to 20/40
Case 2	20/200 to 20/30
Case 3	20/100 to 20/20
Case 4	20/100 to 20/40
Case 5	20/30 to 20/15
Case 6	20/40 to 20/15

V. Chorioretinitis—13 Cases

Sinuses operated on—8	
Improved	8

Sinuses treated—3	
Improved	3

Sinuses treated and teeth extracted—2	
Greatly improved	2

Total13

VI. Iritis—Recurrent—26 Cases

Sinuses operated on—5	
Greatly improved	5

Tonsils operated on—13	
Cured	7
Greatly improved	4
Unimproved	2

Sinuses treated—4	
Cured	3
Greatly improved	1

Refused operation—4	
Retrogressed	4

Total26

VII. Cyclitis—9 Cases

Sinuses operated on—4	
Slightly improved	2
Unimproved	1
Lost vision entirely	1
(glaucoma)	

Tonsils operated on—5	
Greatly improved	5

Total9

111 East Sixty-first street.

Discussion: DR. THOMAS B. HOLLO-
WAY: I would like to ask if the cases referred to were isolated focal infections or were they associated with other infections? I refer to the statistics on the slides.

DR. MACKENTY: When these patients came to me they had been through a general medical examination for the exclusion of foci of infection outside of my particular field. In many we found upper respiratory infections. Some had metabolic imbalance and some were in a bad general condition. These did not do well on any treatment. A few had definite upper respiratory infection plus a bad general condition which excluded major operative interference, and were treated palliatively with occasionally marked improvement. In all cases, when indicated, the antra were treated

through openings made under local anesthesia. When antral pathology was found and thus treated, we always expected to get some result and were rarely disappointed. This make-shift antral drainage with depletory treatment of the upper sinuses, combined with the sphenopalatine ganglion stimulation treatment of Sluder, covered our local and palliative methods.

DR. DE SCHWEINITZ: I notice that in the statistical information the cases of chronic uveitis are greatly improved. Was that a permanent condition, or have your histories shown you that there were returns of the pathological condition originally noted?

DR. MACKENTY: To answer Dr. de Schweinitz' question the cases would have to be considered individually. It is my intention to give detailed case

histories of a sufficient number of these patients to clarify this question. In the time allowed for the reading of this paper the statistics had to be roughly lumped together which, of necessity, produced some ambiguity. I would say that in the early cases, in healthy individuals, in whom definite focal infection was found, the results were good, sometimes even miraculous. In the chronic, old or advanced cases results varied. Some went on to complete loss of vision. Others improved slowly over a long period, obtaining eventually a satisfactory improvement. A few got entirely or almost entirely well. In many early cases in the young and healthy, there were no recurrences. When a clear-cut focus was demonstrated in the sinuses and removed, we had better results than when the focus seemed to be in the tonsils alone. This is probably due to the now well-established fact that chronic tonsillar disease is prone to set up a chronic sinusitis. In removing the tonsils we may therefore often relieve only part of the causative factor.

DR. GEORGE S. DERBY: What was the period of observation, in general, of some of these cases.

DR. MACKENTY: Observation in some patients extends as far back as twenty or more years. A great many of them have been under observation for several years. In the majority no recurrences were recorded. Chronicity was much more in evidence than recurrence.

DR. HARVEY J. HOWARD: How do you explain the improvement following the rather extensive opening of the sinuses in uveitis disease, or when the rhinologist says that he found no evidence of the infection in the sinuses?

DR. MACKENTY: What I have said in the paper relative to concealed or latent sinus disease partly answers Dr. Howard's questions. There are instances on record in which it was stated that no pathology was found and in which the patient improved after operation. We do not know how carefully these observations were made. The knowledge of the microscopic pathological anatomy of the sinus fields is not so old or in the past so well understood as to

justify us in accepting the above statement without question. We do know and we have demonstrated by laboratory examinations of removed tissue that disease may exist in the bony walls of the sinuses without giving macroscopic or clinical evidence of its presence on casual examination. We also know that in many instances a careful case history and repeated and close scrutiny of the nasal sinus areas have brought forth conclusive evidence of disease where none had been thought to exist. Dr. Eggston's paper, based on a large laboratory experience in this kind of work, is most instructive and enlightening. The laboratory technicians, in all the cases reported in this paper, found evidences of bone disease in the tissue submitted to them. When the disease was patent at operation, the laboratory was not consulted.

DR. W. L. BENEDICT: In view of the inability to eradicate sinus disease completely, to what do you attribute the improvement of uveitis?

DR. MACKENTY: I did not state that in all operations we were unable to eradicate the disease. I brought up the difficulties encountered in order to throw light upon the lack of uniformity in results. An inexperienced surgeon at one end and a difficult patient at the other make for a poor result. In many cases the sinus disease is eradicated, at least sufficiently to establish drainage, and relieve the toxic load on the eye and reestablish nature's ascendancy. The disease is then clinically cured. It is my firm conviction that many failures are due more to defective surgery than to faulty diagnoses.

DR. T. D. ALLEN: In what percentage of cases is it necessary to operate? In what percentage will treatment avail?

DR. MACKENTY: In the early, mild, and slowly progressive cases, local treatment should be tried. The percentage of cures by local methods is not large. In a much larger percentage operation is more successful. Just when to shift from palliative to radical methods must be decided, to a large extent, by the ophthalmologist in charge. We state to him the extent, character and probable outcome of the nasal disease

but we cannot make the final decision. In tonsillar disease, local treatment, in the face of an advancing eye infection, is the worst kind of quackery. Here operative interference should be 100 percent. It is my experience that only a small percentage of sinus cases yield to palliative treatment, mostly the mild acute cases.

DR. CONRAD BERENS: Have you seen many bad results from radical sinus surgery?

DR. MACKENTY: I have at times seen no help from sinus operations and I have seen the disease in the sinuses made much worse by badly done operations as well as by well done operations in anatomically difficult situations. Years of experience have given me a wholesome respect for the intranasal radical sinus operation. Three patients with unilateral blindness and evident sinus disease were operated on with no result. Later evidence of intracranial trouble arose. In one, a ruptured aneurism, in the circle of Willis, caused death. These mistakes are inevitable and occur in all surgical departments. The bad results in sinus operations are often due to so-called conservative surgery. The removal of one-half of the appendix would not cure appendicitis. No more will the removal of one-half the diseased area in sinusitis cure the condition. Incomplete surgery in this field is as pernicious as in any other.

With careful selection of cases, expert and sufficiently radical surgery, I have seen no bad results from sinus operations. This statement excludes meningitis, always a possible complication, and mistakes such as might occur in the three cases mentioned above.

DR. G. S. DERBY: Can you give us an estimate of the number of people over the age of forty living in a northern climate who would have normal sinuses microscopically if they were examined?

DR. MACKENTY: It would be quite impossible to answer Dr. Derby's question. One might as well try to state what percentage of people have appendicitis or salpingitis. I can see Dr. Derby's inference. It may be stated thus: Chronic sinusitis in northern climates is so common that the finding of microscopic evidence of the disease has little or no significance. It is unquestionable that low grade sinusitis is very common, not only in northern but in southern climates as well. Thousands of people have diseased appendices and gall bladders and are entirely unaware of it. It is the same with sinusitis. Unless something arises to break down the immunity of these patients to their local infections, health equilibrium is maintained. But once this somatic resistance is disturbed, trouble begins. The eye is but one target in many for the flood of infections which thus may enter the system.

NEW DIAGRAM FOR TESTING BINOCULAR DIPLOPIA

RAMON CASTROVIEJO, M.D.
CHICAGO

A scheme is presented to render easy and certain the diagnosis of the affected muscle in cases of diplopia due to paralysis of an ocular motor nerve. From the department of Ophthalmology of the Chicago Eye, Ear, Nose, and Throat Hospital.

Foreword: It would be unbecoming on my part to begin a paper on this subject without mentioning Professor Manuel Marquez, a former teacher in the University of Madrid, who with his clear and convincing ideas of presenting his instructions to beginners in ophthalmology with drawings, gave me a better conception than by lectures or long complicated descriptions found on this subject. To him belongs the scheme presented in figure 1, representing the monocular action of the eye muscles, and my method is based on this one; therefore, to him I dedicate this modest contribution as a fruit of his endeavor to impart knowledge and awaken interest in beginning students of ophthalmology.

In figure 1, is represented a schematic plan to describe the action of the ocular muscles, reproduced from Fuch's textbook, as is also the following description which is included as a necessary introduction to the writer's diagram.

"The action of each muscle is shown by an arrow which represents this action as decomposed into components according to the parallelogram of

amount of tilting. The inferior oblique in accordance with its elevating action, is drawn on the upper rim of the outer circle, and the superior oblique, because of its depressing action, is drawn on the lower rim.

"There are shown by this plan: (1) That the action of the medial rectus and the lateral rectus, alone, is simple; that of all the other muscles being made up of two or more components. (2) That for all movements, except the purely lateral ones, two or three muscles act in concert. (3) That when this occurs, two out of three components of each muscle are, in a large part, nullified, because opposed by those of other muscles so that in general only the third set of components, which have the same direction and, hence as if added together, come into play."

From this diagram of monocular movements, we can easily derive the binocular movements as represented in figure 2, in which it is seen that when the eyes move in the six cardinal directions of the gaze, there is always one muscle of each eye giving predominance in that direction, as represented in the following table:

Cardinal directions of gaze	Right: right external rectus; left, internal rectus.
	Left: right internal rectus; left, external rectus.
	Up and Right: left, superior rectus; right, inferior oblique.
	Up and Left: right, superior rectus; left, inferior oblique.
	Down and Right: left, inferior rectus; right, superior oblique.
	Down and Left: right, inferior rectus; left, superior oblique.

forces. The components representing the torsion are drawn on the outer circle and indicate with their apices the position of the extremity of the vertical meridian when the upper end of the latter has been tilted by the muscle inward and outward, as the two dotted lines crossing in the center of the figure represent. The curved arm, in other words, shows the direction in which the vertical meridian is tilted, and the

If, now, we remember that in paralysis of the eye muscle, there is limitation of the movements in the field of action of the paralyzed muscle, it will be easily understood in which direction the paralyzed muscle does not move, but as the other eye moves normally, the squint can be determined by observing the field of action of the antagonistic muscle in which direction this squint takes place.

For instance: In paralysis of the rectus medialis of the right eye, when the eyes move to the left, the right eye will be deviated toward the right in the field of action of the external rectus, and therefore there will be a divergent squint. In paralysis of the superior oblique of the left eye, when the eyes move down and to the left, the left eye will remain in the direction of movement of the superior rectus, of this left eye, and therefore there will be a vertical, convergent squint.

As we know that diplopia occurs in the field of action of the paralyzed muscle, and having this diagram of figure 2, it will be very easy to find the position of the false image by drawing it in the direction of the movement of the paralyzed muscle, and then we will obtain figure 3 in which the fixed image of the sound eye is represented in the center of the affected eye to have a point of comparison and to detect the nature of the diplopia.

The way that we examine our patients for diplopia is by using a pair of spectacles with glasses of different color in each eye, right eye, green, left, red, but the same result could be obtained by using one color glass in one eye. We have adopted two colors in order to make the drawing more manifest, and because of the facility of obtaining one of these spectacles which most specialists use for the malingering test.

The other device consists of an electric bulb enclosed in a pasteboard box, with a cut-out in the shape of an arrow, 10 cm. long, and a uniform illumination obtained by placing a frosted glass behind this slit, which distributes the light from the bulb (figure 4).

The picture explains how the paralyzed muscle is detected. An example will suffice to make perfectly clear the use of this method:

Suppose a patient comes to us with double vision. By using this scheme, holding the second device about 6 feet from the patient, we ask him where the red image of the arrow is. In this

way we will find whether the diplopia is homonymous or heteronymous. If homonymous, we know that it has to be one of the muscles located outside of the vertical line passing through the pupil, and thus, one of the abductor muscles. If both the fixed and false images are located on the same level of the horizontal plane, and the images separate by moving the arrow of light to the right, we will know that the paralyzed muscle is the external rectus of the right eye.

If the false image separates toward the right and is located above the fixed image, and with the vertical meridian tilted to the right when we move the light in the right and upward direction of the gaze, it is indicated that the paralyzed muscle is the right inferior oblique. In the same way all the other muscles may be indicated.

This diagram also explains the tilting of the head. If we have a paralysis of the rectus lateralis of the left eye, the patient will compensate the absence of movement of this muscle by rotating the head to the left; but if the paralyzed muscle is one with 3 actions, as they all have, except the rectus lateralis and medialis, the head will be tilted as a compensatory mechanism of the patient to bring the false image in line with the fixed image, and so we will have a tilting of the head to the right in paralysis of the inferior oblique and inferior rectus of the right eye, and in the superior rectus and superior oblique of the left eye; and a tilting of the head to the left in paralysis of the superior rectus and superior oblique of the right eye, and the inferior oblique and inferior rectus of the left eye.

The same study for detecting paralysis of the eye muscles can be used for spasms, always considering that spasm of one muscle gives the same kind of diplopia as a paralysis of the associated muscle, and a diagnosis of spasm is made by a study of the field of fixation of each muscle, being diminished in paralysis and increased in spasm.

231 West Washington street.

EPINEPHRIN IN PROGRESSIVE MYOPIA

3. Phase of pupillary reaction

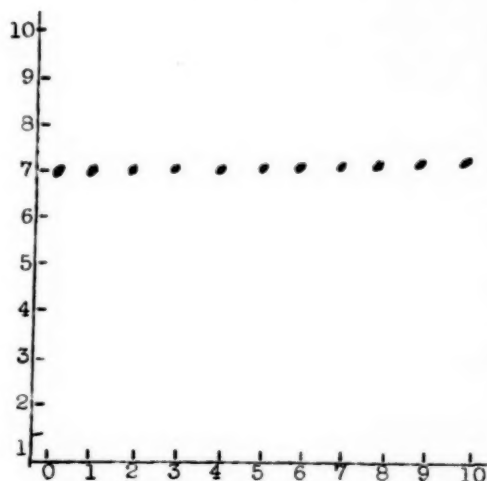
LEO L. MAYER, M.D.
CHICAGO

Pupil size was carefully measured at one minute intervals after instillation of epinephrin in dilutions 1 to 1000, 1 to 500, 1 to 250, and 1 to 100 in ten patients with nonpathologic eyes. Only the lowest dilution caused dilatation in the majority of cases. This effect became noticeable immediately and reached its maximum in five or six minutes. From the Ophthalmological Service of the Mandel Clinic and the Michael Reese Hospital.

Changes in the size of the pupil due to instillation of various concentrations of epinephrin are recorded in this communication. Previous papers have shown the effect on blood pressure and pulse rate¹, and ocular tension². The work of Wessely³, Schultz⁴, and Meltzer and Auer⁵ early in this century, concerning the action of epinephrin on the pupillary mechanism caused by dilute solutions is well known. A perusal of the literature however, fails to reveal any attempt at exact measurement. Hamburger⁶ brought out epinephrin combinations which he called glaucosan. The mydriasis caused by "Dextro" and "Links" glaucosan, the miosis with the amineglaucosan are well known clinically, as noted in the treatment of glaucoma. Wessely⁷, Cords⁸, Schultz⁴,

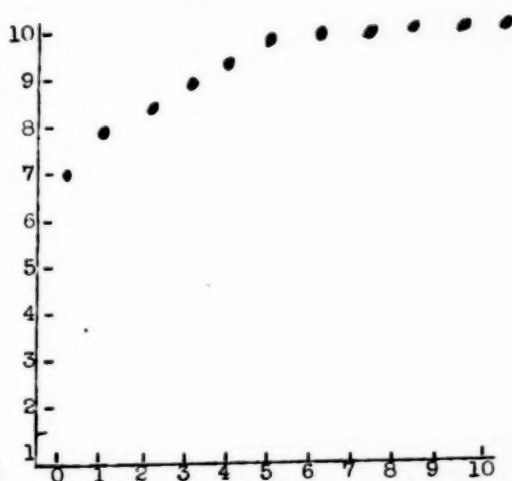
and Elliot⁹ reported no effect on the pupil with instillations of 1-1000 epinephrin. However, Arnold Knapp¹⁰ in a small series found 12 eyes dilated and in 3 no change. Even when subconjunctival injections were used Reutz¹¹ noted that maximal dilatation was not the rule in all cases. The physiology of the mechanism of action has been studied by Krog¹² and Oinuma¹³. Gradle¹⁴ found that epinephrin packs cause beginning dilatation in from 2½ to 4 minutes in an irregular manner. Maximum dilatation using 4 minims was obtained in from 7 to 10 minutes. That the effect on the pupillary reaction is influenced by the pigmentation of the iris, and possibly of the entire anterior uvea, is a well known fact. Many authors feel that differences are due primarily to this

Epinephrin 1-1000



CURVE No. 1

Epinephrin 1-100



CURVE No. 2.

Time in minutes on base line.

Pupil size in millimeters on vertical line.

fact. The use of subconjunctival injections of epinephrin in combination with cocaine to break iris adhesions is a court of last resort in obstinate cases of plastic iritis. As far as could be determined no quantitative measurement of pupillary changes due to epinephrin in high concentrations could be found in the literature. In the investigation the same room was used each day, at approximately the same time of the early afternoon, and thus the same amount of light was assumed. Measurement was made by reflecting various sized round holes on the cornea. Many will recall that the Morton reflecting ophthalmoscope which is made by Todt in Vienna has a series of these discs.

No attempt is made to correlate changes in ocular tension with size of pupil. The former has been discussed in a previous communication². Young individuals, whose pupils are usually wider than those of the middle aged, were subjects. It was felt that there would be no objection to this factor because

the same persons were the subjects of the investigations previously reported. Ten patients were examined, epinephrin in the following strengths, 1 to 1000, 1 to 500, 1 to 250 and 1 to 100, being used. Three minims of the solution were instilled in each conjunctival sac and pupillary measurements were made at intervals up to ten minutes. Findings were recorded but are not published in toto as the reactions were similar in all cases of this series. Typical curves of pupillary change with 1 to 1000 and 1 to 100 epinephrin are shown.

Conclusions:

1. Epinephrin 1-1000 in the majority of cases causes no dilatation of the pupil.

2. Epinephrin 1-250 and 1-500 do not cause pupillary dilatation in the majority of cases.

3. Epinephrin 1-100 causes dilatation of the pupil beginning immediately after instillation, and reaches a maximum in from 5 to 6 minutes.

104 South Michigan avenue.

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PROGRESS IN MEDICAL AND SURGICAL TREATMENT IN OPHTHALMOLOGY

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SAINT LOUIS

This paper is a summary of the newer treatments in ophthalmology from the autumn of 1930 to the autumn of 1931. It is a continuation of Dr. Rutherford's report of the previous year. Presented before the Academy of Ophthalmology and Otolaryngology, September 17, 1931.

When one considers the number of journals extant, both those of a general and those of a special nature, the amount of printed matter making up what we term medical literature is enormous. It is manifestly impossible to review all of the articles dealing with ophthalmology or with all phases of our specialty. It will be my endeavor, therefore, to bring to your attention a review of those subjects which are at present claiming the interest of the rank and file of ophthalmologists.

What constitutes progress, and in our particular case, progress in ophthalmology? It is true that a great deal is written and printed but much of it is not new, in fact much of it is very old. Many articles are résumés, compilations, and restatements of previous writers, often perpetuating and carrying on antiquated theories and methods. Anent this is the following sad but true quotation from Holloway¹: "Unfortunately, for certain purposes, medicine is not free from its vogues and fads, nor from those who quickly place immature and uncertain data before us bearing on every new problem presented; the competitive author also contributes his share; and last but not least we have those contributions where the most carefully studied and the most convincing thing in the literary product is the title."

Progress may be properly interpreted as the continuation of or improvement upon what has gone before even if that improvement involves the destruction of cherished theories, practices, or methods. It need not be new, in fact anything really new is a *rara avis*. The so-called new is but an elaboration or further development of what has previously concerned many minds in many times.

The subject of greatest interest covered by last year's Progress lecture seems to have been Gonin's operation as evidenced by the fact that forty-two percent of the references and two-thirds of the text in Dr. Rutherford's paper² was concerned with retinal detachment. Nor does its popularity seem to have waned in the succeeding year. Anything which offers the slightest aid in such a deplorable condition as detachment must possess dramatic interest.

Gonin operation

Lindner thinks that Gonin's treatment is one of the most important advancements in recent ophthalmology. Since this operation continues to hold the interest of ophthalmologists it is fitting that the literature relating to it be reviewed and continued where Dr. Rutherford left off.

In carrying out an operative procedure it is well to adhere to the method devised and perfected by the originator especially when the latter has obtained a high percentage of favorable results. A fair and sufficient trial should be given until its worth is assured or its defects made apparent; and suitable cases should be selected. Those who are able to report a high percentage of cures by *ignipuncture* have exercised meticulous care in diagnosis, localization and operation. Others, careless of, or indifferent to minutiae have experienced less success.

The later articles of Gonin³ have been a reiteration of his contentions and a reaffirmation of the principles underlying them. In his article published in the Archives of Ophthalmology for November, 1930⁴, he deals chiefly with the theoretical side of the question.

It has been pointed out repeatedly

that selection of cases should be exercised when the Gonin procedure is considered. It is logical to assume that early cases should offer the greatest chance of success. Failure may be due to the presence of an unrecognized second tear. A disregard of these facts is likely to bring the operation into disrepute. However, old cases and unpromising ones should not be denied the chance, even though slight, of possible benefit.

Why detachments do not develop more frequently from retinal degenerative changes with large holes in the retina is a mooted question⁸; it is admitted on the other hand that detachments occur without any demonstrable tear. The consistency of the vitreous plays a part in the successful outcome of the Gonin operation. When thick, coaptation of the edges of the tear is difficult. Hence the detachments in myopia offer the best chances of success since the vitreous is usually "fluid." Elschmig has found the Gonin operation of great value as demonstrated by his results, especially in myopia of high degree. The results of Lindner⁶ corroborate in the main those of Elschmig and give rise to considerable optimism. Lindner's successes varied from twenty-four percent to sixty-four percent depending on the character of the detachment, whether with or without a tear, and on the length of time the detachment had existed. Results were considered permanent if reattachment was maintained two to three weeks. For larger tears a longer cauterization (8 to 20 seconds) is indicated and is considered not harmful. Detachments in the macular region offer the least favorable prognosis. The reattached retina may regain its function even after several months of detachment.

Cauterization should be guarded when the retina is still adherent at the macula as retractions follow that may eventually destroy central vision. Heterotopy of the macula from cicatricial distortion of the retina has followed ignipuncture. Stein⁷ encountered diplopia following a Gonin operation. This was explained as a result of traction

displacing the original site of the fovea. If the cauterizations do not give successful results Lindner⁶ does not hesitate to repeat them and he also believes that old detachments should have the chance of operation as twelve percent are capable of improvement.

Fisher⁸ contributed a purely theoretical consideration of the Gonin operation. To the author Gonin's procedure seems to achieve success by "excluding" the hole in the retina.

Some operators use a small quick puncture of the sclera with the electrocautery; others employ a prolonged searing of the edges of the tear (8 to 20 seconds). A preliminary puncture of the sclera is preferred by some while dispensed with by others. Much depends upon the character of the detachment. P. Knapp⁹ reserves the use of preliminary puncture for evacuation of the subretinal fluid in large detachments and in flat detachments direct ignipuncture through the sclera is done thus avoiding loss of vitreous. The thermocautery is preferred to the electrocautery because of its shorter application though it cannot be used at as low a temperature as the electrocautery.

The operation of ignipuncture is varied in detail by a number of operators but the basic principles are retained. Doggart and Shapland¹⁰ report the use of a white hot electrocautery to puncture the sclera and evacuate the subretinal fluid. The cautery is again heated to white heat and plunged through the first opening into the eye to a depth of one centimeter. The duration of the searing is two seconds. Of seventy-five cases operated upon at Moorfields in 1930, twenty-four were discharged with the retinal detachment back and the field full; twelve improved either in acuity or field; the remaining thirty-nine were unimproved or worse.

Larrison's¹¹ method consists in exposure of the sclera, checking of hemorrhage by electrocoagulation, application of surgical diathermy over the exposed sclera and one or two trephine openings with an Elliot trephine which provide an outlet for the subretinal

fluid and prevent rise of tension. This method does not require the localization of the retinal tears necessary in the Gonin operation. The method is supposed to act by setting up an adhesive choroiditis and by diminishing the secretion of the choriocapillaris through atrophy of the healed choroid.

Manes and Moulic¹² observed the manner of investigation and treatment of retinal tears in various European clinics. In Sourdille's clinic treatment consists in the production of chorioretinal adhesions by means of injections and cauterizations. In one hundred and seventy operations by this method there were seventy-one perfect recoveries and six partial ones. Of the former sixty occurred after three months and none after six months.

There seems to be a growing opinion that it is not necessary to locate the tear exactly but all that is required is to cauterize at the most accessible place in the detachment. However, if a tear can be seen and localized it is desirable to cauterize at the site of the tear.

Deutschmann¹³ in a review of five hundred and thirty-nine ignipuncture operations claimed results as good as those accredited to the Gonin procedure. The essential factor in ignipuncture is believed to be a relaxation of tension of the retina; he does not agree with Vogt who assumes that the retinal tear is the primary cause. Closure of the tear does not always cure the detachment. The tear is looked upon as possibly a mechanism that protects the retina from tension. Many of the successful cases in ignipuncture were old cases or those in which no hole could be found.

Van Lint¹⁴ believes it is advisable to cauterize at the most accessible place in the detachment. It is pointed out that there is no absolute proof of the etiologic rôle of tears in the production of detachment. The author feels that the merit of Gonin's work lies in showing that the eye and vitreous can withstand the introduction of a cautery.

Jeandelize and Baudot¹⁵ do not think it is necessary to introduce the cautery into the vitreous in order to produce

an adhesive choroiditis. Finlay¹⁶ feels that there are certain theoretical objections to the method of Gonin. One is that the cauterization through the coats of the eye might establish a permanent fistulous tract. He proposes a modification which consists in evacuating the subretinal fluid by incision with cauterization of the sclera adjacent to the scleral incision but avoiding its edges. Of seven cases so operated only one was successful.

From the number of simple methods advised for the accurate localization of retinal tears, one can hardly escape the conclusion that such localization is not so simple or every method infallible. A retinal tear observed in the erect position may change its position several millimeters when the patient is recumbent. Some very ingenious methods have been devised for localizing tears, but too often they possess an element of error which impairs their value. The following authors have described means of localization but space does not permit of their description: Lindner¹⁷, Salzman¹⁸, Safar¹⁹, von Imre²⁰, Comberg²¹, Cowan and McAndrews²², and Majewski²³.

An editorial in the American Journal of Ophthalmology, February, 1931, by Crisp²⁴ is so apropos, in view of the conflicting opinions regarding ignipuncture, that I am tempted to quote it in its entirety but because of its length shall not do so. It is well worth reading. The concluding paragraph of Crisp's excellent article is as follows: "It is well to bear in mind that Vogt's extremely scientific analysis of the problem has led him to declare that every future investigation of the etiology of spontaneous detachment will start from the conclusion that this accident is directly due to a hole in the retina."

Cataract

Occasionally articles appear dealing with the medical treatment of cataract. In the past recourse has been had to numerous drug measures either given by mouth, injected under the conjunctiva, dropped or rubbed into the eye or carried there by the electric current.

They have not been efficacious except in very incipient cases. Even in incipient cases it is doubtful if medical measures cause a disappearance or cessation of the lenticular changes for it is well known that such changes may show a cessation for long periods of time when untreated. Nevertheless attempts are made to remove or at least retard lenticular changes by some form of medication. Kirby²⁵ desired to ascertain the effect if any on cataract by the administration of parathormone. It was given in selected cases with no improvement in the vision or objective appearance of the cataracts.

Marquez²⁶ looks upon the use of drops, baths, electricity, etc., as useless in cataract and that endocrine and immunologic studies alone will lead to success. Lens albumin is organ specific and when injected produces phacoly-sins but the important point is made that antigens of clear lenses and cataractous lenses are not the same.

The desire to avoid the results of retained capsule and cortex spurs men on to improve the cataract operation by seeking the ideal in some form of intracapsular operation. One does not hear as much of late as formerly regarding the Smith Indian operation as originally performed. Modifications have been sought and practiced in the hope of avoiding some of the inherent dangers and disadvantages of that method. The modifications have been so extensive as to leave little of the original technique except the cardinal principle of extracting the lens in its capsule or attempting to do so. The Stanculeanu-Török operation finds favor with a number of Continental surgeons while in America the method as practiced by Knapp seems to be preferred. The Barraquer method though not widely used still has a few ardent advocates. Wolfe²⁷ contributes a recent article on the Barraquer operation with an analysis of results and comments. Van Lint's²⁸ operation differs from the usual Barraquer in that the incision is made on the temporal side of the cornea. A large flap is made and the eye opened with a keratome and the incision enlarged with scissors. A small

high peripheral iridectomy is made. Barraquer's instrument is then used to extract the lens in its capsule.

Arruga²⁹ uses the Stanculeanu-Török method of extraction having operated over two hundred times in three years. The conclusion is reached that this method is applicable to all cases and is less prone to be complicated. Recovery is more rapid and the operation can be performed before the maturity of the cataract. There is no secondary cataract. The operation is admittedly more difficult. Varshavski³⁰ also employs the Stanculeanu-Török method. Of eighty-one cases reported by him the capsule was broken in thirty-three, vitreous lost in 5.6 percent as compared to 4.3 percent in extracapsular extraction. Iris prolapse was equal in both procedures. The visual results were strikingly low, attributed to disturbances in the vitreous.

The cataract procedure as carried out at Moga, Punjab, by O'Malley³¹ is that all cataracts except in the young are removed intracapsularly.

The Smith operation is condemned by Mills³² because of large vitreous losses. Barraquer's operation requires special skill and apparatus precluding its general use. Mills prefers Knapp's method of capsule traction plus full suturing of the conjunctival flap.

The factors making for success in the intracapsular operation using the Kalt forceps, are the thickness of the capsule, its tension, and elasticity. Røth and Klein³³ found the capsule thicker in cataractous lenses than in normal ones of the same age. The operation can be successfully done even with a normal capsule thickness.

The third hundred cases of intracapsular extraction with the use of the Kalt forceps has been analyzed and reported by Knapp.³⁴ His results are exceedingly good as to vision, and complications relatively few for an intracapsular operation. Vitreous was lost in seven cases; the loss was small and did not affect the result. Iridocyclitis was met with in eight cases. Reopening of the wound with hyphemia occurred in ten cases. This lengthens the time of hospitalization but usually does not af-

fect the results. Expulsive hemorrhage occurred in one case and detachment of the retina in two; one after a year and one after eighteen months. Prolapse of the iris was seen in one case. The prolapse was excised and vision equaled 20/20. Glaucoma apart from that accompanying cyclitis was not seen.

Argañaraz³⁵ favors intracapsular extraction according to Elschnig's method.

A critical review of intracapsular cataract removal has been recently made by McAndrews³⁶. In it the three favorite methods have been carefully scrutinized, viz.: the Smith Indian, Barraquer, and the forcep method as practiced by Knapp using Kalt forceps. The conclusions reached were, (1) the prophecy of Smith appears to be unsubstantiated, (2) the intracapsular operation is rapidly gaining ground in America and Europe, (3) classical capsulotomy is still the most popular method of cataract extraction among most surgeons, (4) the Smith method has apparently fallen into disuse, (5) the Barraquer method is attracting little attention from the majority of surgeons here and abroad, and (6) the forceps method of cataract extraction is at present the most popular for intracapsular cataract operations.

Glaucoma

In an endeavor to hit upon some satisfactory substitute for glaucosan, Green³⁷ selected a two percent solution of suprarenin bitartrate supplied either in ampoules or in powder form for immediate solution in distilled water. The results obtained have been comparable in efficacy to those produced by levoglaucon without some of the latter's disadvantages.

Rauh³⁸ is of the opinion that in glaucoma simplex one may be able to postpone operation for weeks or months with the use of glaucosan.

Heimann³⁹ considers glaucoma as an angioneurotic edema produced by an imbalance between the sympathetic and parasympathetic systems. This disturbance is manifested by a pathological permeability of the walls of the

blood vessels. He advocates various water cures and a salt free diet.

Hamburger⁴⁰ calls attention to the fact that ocular inflammations tend to produce a softening of the eye which is a rule contrary to that in inflammations in other parts of the body. Ophthalmic operations and drugs both produce inflammation in varying degree and possibly explains to some extent their beneficial action. The author attempts to bring about the desirable side-results of inflammation by deliberately provoking it in cases in which operation is too hazardous. This is accomplished by cauterizing the cornea in the upper nasal quadrant with silver nitrate stick. The cauterization should not be too violent or too mild.

Lens changes or other opacification of the media may make observation of the fundus impossible before glaucoma operations⁴¹. Such eyes may harbor a malignant intra-ocular tumor and operation may jeopardize the life of the individual by causing delay and dissemination of the tumor cells.

Zirns operation for glaucoma consists of a number of subconjunctival cuts made parallel and adjacent to the corneoscleral junction, partly through the sclera. A tiny opening is made in the center of the longest cut, is slightly enlarged on either side, and a broad iridectomy is performed. The operation found favor with Stastnik⁴² who considers it the one of choice when the anterior chamber is very shallow.

The variant in the Elliot operation reported by Brookes⁴³ consists in the formation of a bleb, made by the injection of novocain and adrenalin, produced at the site of the proposed flap. It allows of ease and speed in making the flap since the injected fluid defines the line of cleavage. Elliot⁴⁴ has taken exception to some of Brookes' statement and replies that he himself had tried this procedure and discarded it as useless.

DeGrosz⁴⁵ found the operations most adequate for the various types of glaucoma to be the following:

Inflammatory glaucoma prodromal and acute stage: iridectomy (von Graefe).

Chronic inflammatory glaucoma: cyclodialysis (Heine); trephine (Elliot).

Glaucoma simplex: iridosclerectomy (Lagrange).

Juvenile glaucoma: anterior sclerotomy (Wecker).

Glaucoma degenerative stage; enucleation (Arlt).

For quite a time cyclodialysis was dormant. From the number of references one meets of late there appears to have been a renewed and new interest in this operation for glaucoma. Slavik⁴⁶ found that cyclodialysis gave the best results in glaucoma simplex, secondary glaucoma, especially that following cataract extraction, and in absolute glaucoma which follows simple glaucoma.

It has been pointed out by Holth that those who contemplate adopting cyclodialysis should consider the possibility of cataract due to the atrophy of the ciliary body.

More and more attention is being directed to iris inclusion operations for the cure of glaucoma. It is, in the opinion of Herbert,⁴⁷ inevitably the future treatment for many primary chronic glaucomas. This author feels that iris tissue in a corneoscleral wound accomplishes something in the matter of drainage that nothing else can ever do. An essential point in the technique is the production of an iridodialysis at the time the iris is grasped immediately preceding the iris incarceration in the corneoscleral wound. But little drainage is needed to keep down tension and no conjunctival bleb is formed. To obviate failures iridencleisis should not be done in glaucoma associated with past or present iritis or iridocyclitis. The threat of sympathetic ophthalmia must be dissipated by scrupulous attention to the conjunctiva.

Three types of anterior sclerectomy which had been tried by Holth⁴⁸ were finally abandoned in favor of iridencleisis with meridional iridotomy. As a rule the anterior sclerectomies including Elliot's trephining have been reserved for chronic glaucoma. Iridencleisis, however, is recommended for both acute and chronic glaucoma. Absence of late

infection, of expulsive hemorrhage, of closure of the filtering canal, and no need for prolonged use of miotics are advantages possessed by iridencleisis. Holth looks with disfavor on iridotasis. The technique of iridencleisis is not difficult but is greatly facilitated by use of the proper instruments.

A series of iridencleisis operations and results was reported by Blaickner⁴⁹. The hazard of infection is equal to that of a cataract operation. All but one were for simple or chronic inflammatory glaucoma. Vision was improved in seventeen cases, unaltered in thirty, while it was worse in five and lost in three. The visual field was improved or maintained in sixty-six percent and the tension was primarily reduced to normal in seventy-eight percent. A preformed flap was used instead of the present Holth incision. The operation is contraindicated in juvenile glaucoma, glaucoma complicated by cataract, and subluxated lens.

A most disconcerting sequel to cataract operation is the development of a chronic glaucoma whether caused by lens capsule, lens debris or following needling. To meet this fairly common condition Wolfe⁵⁰ has employed iridencleisis.

Swett⁵¹ has added a variant to the classical iridencleisis operation. A keratome or Graefe incision is made, followed by an iridectomy. The removed iris is floated out in normal saline solution and a piece is cut off and inserted in the sharp angle of the incision where it is firmly gripped as the edges of the wound come together. The conjunctival flap is replaced. He believes this procedure is superior to iridotasis and iridencleisis in that the incarcerated tissue of the iris and the iris are not connected.

Filtration operations that lead to subconjunctival drainage are condemned by Suker⁵² as mechanically at fault. Cyclodialysis escapes this criticism but possesses other drawbacks. The Mauksch operation, to quote Suker, is a suprachoroidal iridotasis or intra-ocular iridencleisis and is mechanically a combination of nearly all the

filtration operations, viz.: sclerotomy, cyclodialysis, iridotaxis, iridencleisis, and at times iridectomy. Iris allowed to remain subconjunctival is regarded as a weak point in iridencleisis. The Mauksch operation is designed to replace subconjunctival with suprachoroidal drainage.

Trachoma

The question has been raised as to whether or not acute trachoma truly exists. So-called acute trachomas are generally looked upon as secondary infections with other organisms, yet evidence is at hand to refute this contention⁵³. Also, we have been taught to believe that one of the cardinal qualities of trachoma is its infectiousness. In this iconoclastic age, however, this point has been questioned⁵⁴.

A disease as persistent and resistant to treatment as trachoma and its accompanying pannus is most likely to have every form of therapy applied for its alleviation. Medvediev⁵⁵ has used autohemotherapy in the treatment of trachomatous pannus and claims that it relieves the subjective symptoms in most cases. How it affects the human body is not satisfactorily explained but it is thought to raise the biotonus of the organism in most of the patients. All of which is not perfectly clear.

As a result of the examination of the conjunctival secretions with reference to hydrogen-ion concentration, which in diseased conditions showed a displacement in the direction of acid reaction, the use of bicarbonate of soda in powder or solution was deemed justifiable⁵⁶; the object was to produce normal conditions by alkalescence of the tissue. The treatment is recommended as an independent or auxiliary therapy in corneal or conjunctival affections, especially trachoma.

Local immunity is considered as the probable dominant factor in the cure of trachoma, as in man the conjunctiva is the only tissue susceptible to this infection. The experiments of Esteban⁵⁷ were suggested by the work of Vancea who triturated trachoma granulations

with saline solution and sterilized it by heating to 50° centigrade for thirty minutes. The product was injected subconjunctivally in doses of 0.5 cc. to 5.0 cc. at three or four day intervals. Disappearance of the follicles took place. Esteban carrying out similar experiments with slight modifications as to sterilization, obtained results similar to Vancea.

Coppez⁵⁸ has treated trachoma by surgical diathermy using the technique of Monbrun. The cases were severe, being complicated by pannus and corneal ulcers. The results were said to be prompt and gratifying.

Experimental evidence of the relationship between trachoma and deficiency of vitamin A was not forthcoming in the work done by Kendall and Gifford⁵⁹ on white rats. The possibility of a high degree of resistance to trachoma by the white rat may overcome the effects of a vitamin A deficiency, hence the results are not conclusive.

Martinez Salaberry⁶⁰ massages the conjunctiva with sodium chloride after anesthetizing with cocain. The everted upper lid is sprinkled with 100 to 200 mg. of fine salt which is rubbed in vigorously with a cocain soaked flat applicator. Pain is not severe but lacrimation is great for six or seven hours. After 24 to 48 hours all subjective symptoms lessen and discharge decreases. Granulations disappear and the conjunctiva recovers normal brilliancy. After five or six applications pannus and ulcers disappear. The method has been used by the author for over two years with eighty percent clinical cures, the remainder greatly benefited and with injury to none.

The corneal lesions of trachoma have been treated by the use of massage combined with the instillation and subconjunctival injection of oxidizing (chlorine) and proteid solvent (alkali) compounds.⁶¹

Intravenous injections of 2.0 gm. thiosulphate and 0.02 mg. sulphate of copper in 9.0 cc. of distilled water every fourth day up to a total of ten injections, have been used by Stastnik⁶² in

trachoma with good results and only mild systemic effects.

A freshly prepared four percent solution of copper ammonium sulphate has been employed by Wilson⁶³ intravenously. The average dose was 0.5 cc. to 2.0 cc. once daily for fourteen days. Acute cases responded well and promptly; no change took place in thick pannus or palpebral conjunctiva.

Denig interposed a section of mucous membrane from the mouth, between the conjunctiva and upper corneal limbus. This was done on the supposition that the mucous membrane of the mouth was immune to invasion by trachoma. Friedman⁶⁴, from microscopical sections, found this not to be the case. Furthermore, the vascularity of the pannus was not altered by the removal of the conjunctiva and substitution of the graft. The Denig transplant was found by Karbowski⁶⁵ to be inferior to peritomy in trachomatous pannus. In addition peritomy has a better cosmetic effect than the Denig operation and is much simpler.

Light therapy

The vogue of ultraviolet rays calls for caution in the use of all radiant energy. That radiant energy possesses potentialities for harm as well as good is quite obvious. Vogt⁶⁶ directed attention to the harm which may ensue in snow blindness and eclipse blindness as being two cases in point. The indiscriminate use of ultraviolet radiation may work for ultimate harm. In the last few years the use of this agent has been greatly extended hence Vogt's article which embraces all radiant energy therapy is most timely.

The ordinary treatment of corneal ulcers leaves much to be desired and any remedy capable of producing quicker and better results will be acclaimed. Nugent⁶⁷ thinks this has been found in ultraviolet therapy and that all other local measures will be put in the discard. Light therapy promotes healing without destroying healthy adjacent tissue as the curette and cautery do. The author suggests light therapy also for trachoma. The Birch-Hirschfeld ra-

diation lamp of Zeiss was used in all cases.

From a review of his experience with ultraviolet light therapy Lawrence Post⁶⁸ thought that it was of benefit in many corneal conditions but had not had success in deeper ocular lesions, with local therapy alone. It was essential that abiotically active rays should be used and for the determination of this activity skin erythema doses were necessary. The mercury vapor lamp having a narrow spectral range possesses a real advantage. The effective rays are those between 2400 and 3100 angstrom units.

Luedde⁶⁹ claims striking success in dendritic keratitis and interstitial keratitis with ultraviolet light.

By the intervention of uviol glass plates one millimeter thick, Gutmann⁷⁰ did away with excessively glaring rays. Ultraviolet to 280 millimicrons is transmitted. A quartz lens of twenty diopeters concentrates the rays focally on the diseased area thus avoiding diffusion over the whole eye. Radiations for two minutes have very good results in eczema of the skin of the lid, ciliary blepharitis, chronic and eczematous conjunctivitis, scrofulous and parenchymatous keratitis, serpent ulcer and iritis. The use of a drop of fluorescein renders the tissues and bacteria more sensitive to light and increases the effect of radiation. Others reporting good results with the Birch-Hirschfeld lamp were Caso⁷¹ in various forms of corneal lesions, Guiseppe⁷² in different types of corneal ulcers, and Del Duca⁷³ in herpetic keratitis. The last two authors used rose bengal as a sensitizer.

Ultraviolet therapy is a valuable adjunct in the treatment of serpiginous ulcer but is in itself insufficient⁷⁴. It seems to shorten the duration of the keratitis.

The principal methods employed by Neuschüler⁷⁵ in the clinic at Rome for the treatment of hypopyon keratitis are roentgenotherapy, ultraviolet light and auto-aqueotherapy.

Several authors have advised the use of vitamin A in conjunction with ultraviolet in ophthalmic diseases. General

exposures of increasing duration were given tri-weekly by Cardell⁷⁶. Vitamin A was given concurrently. The best results were obtained in phlyctenular disease, hordeola, episcleritis, corneal ulcers, and tuberculous iritis.

Vogt⁷⁷ succeeded in producing burns in the retina of rabbits by isolated, short-waved ultrared rays. The action of these short-waved rays is considered to be chemical rather than thermic. The short-waved ultrared rays produce cataracts of glass blowers and men working in foundries. Protection is obtained with ferro-oxydul glass which absorbs these rays to a great extent. The quantity of rays necessary to produce cataract is very small. Cataract may appear months after exposure. This is to be remembered by those advocating small doses of x-ray for the treatment of blepharitis. It may be used to ripen senile cataract.

Foreign protein therapy

Just how foreign proteins help as therapeutic agents has never been satisfactorily explained. There is experimental evidence that the foreign protein is not toxic directly but that the desired reagent is elaborated from the injected protein by the organism. Histological examinations by von Szily⁷⁸ demonstrated inflammation in the ciliary body as shown by dilatation of vessels, increase of lymphocytes, diffuse cellular infiltration, and the formation of circumscribed clumps of lymphocytes. The importance of the ciliary body in the nutrition of the eye makes this of extreme significance.

Raulston⁷⁹ is of the opinion that the immediate factor in producing a foreign protein reaction is a combination of complex amino-acids. The beneficial effect is due to a mobilization of enzymes, a suppression of antiferments, a leucocytosis, and an increased permeability of tissue. He is not satisfied with the explanations given for the diagnosis and improvement of ocular conditions under tuberculin therapy and feels that the very minute doses of tuberculin used cannot possibly have the beneficial effect ascribed to them.

Haass⁸⁰ found that protasin and perprotasin fulfilled the function of a foreign protein which would prolong the anti-inflammatory stage which follows the inflammatory reaction in the eye.

The treatment of gonorrheal ophthalmia by a vaccine containing mixed bacteria appears to be but a variation of foreign protein therapy. Any foreign protein which provokes a general febrile reaction of considerable degree may have a beneficial influence on gonorrheal ophthalmia.

Likewise in other ocular conditions as uveal affections, corneal diseases, etc., Levine⁸¹ found small doses of Coley's mixed toxins given intramuscularly of benefit. The degree of improvement varied directly with the fever reaction. Coley's mixture contains a high percentage of non-specific concentrated proteins.

Tuberculosis

Lemoine⁸² feels that the failure of many oculists to obtain good results with tuberculin is due to the fact that doses are given in the negative phase and that instead of the patient being immunized he is sensitized. It is better to give larger doses at longer intervals than the reverse. In some cases transient immunity may be due to a disturbed endocrine balance; these patients become again anaphylactic because of deficiency of some of their internal secretions. Before making the diagnostic tuberculin test, syphilis and focal infections must be excluded. Along these lines Beulah Cushman⁸³ calls attention to the possibility of syphilis confusing the issue both as to diagnosis and therapy and that recovery may not ensue until treatment for one condition has been supplemented by treatment for the other.

Samoilov⁸⁴ adopts Ranke's classification of tuberculous lesions. Ocular affections are met with most frequently in the allergic period. Tuberculin is of greatest value in the cases with slightly increased sensitiveness and next in those with an incipient general immunity. It is contraindicated in those with marked allergic properties. The

cautious use of old tuberculin is preferred to the newer preparations.

Gomez Marquez⁸⁵ is of the opinion that different types of ocular tuberculosis are explainable by the different relations between two factors, viz.: allergy and immunity. His therapy has been the use of the immunizing bodies of Spengler which consist of extracts of red blood corpuscles of animals intensely tuberculized. Under this treatment phlyctenulæ do well. Results not as favorable were obtained in tuberculous keratitis, iritis, and torpid choroiditis.

Tuberculous retinitis was treated with success by Shoji⁸⁶ using a new Japanese polyvalent tuberculosis vaccine.

Wilkinson⁸⁷ states that there are patients with inflammatory conditions in the eyes who do not benefit by ordinary methods of treatment; many of these patients react to diagnostic doses of tuberculin and treatment with tuberculin produces marked improvement or even arrest of the trouble in a considerable number of these reacting individuals.

Stobie⁸⁸ questions whether it is possible to make a diagnosis of a tuberculous disease of the eye solely on a general tuberculin reaction. He believes that the fact that patients make excellent progress under treatment with tuberculin in no way substantiates the claim that the lesions were tuberculous. He also is of the opinion that the focal reaction is essential to be sure of the tuberculous nature of the eye condition. Patients with this reaction should be treated with tuberculin as they would do well. In those in whom only the general reaction was positive, a non-specific antigen was more rapid in action than tuberculin.

Roentgentherapy

When the optic chiasm is subjected to pressure from hypophyseal tumors, the ophthalmologist is confronted with a situation amenable to few therapeutic measures. Surgery is a radical and dangerous procedure, frequently declined by the patient. Recourse must then be had to roentgentherapy as the only al-

ternative. This is advised by Pfahler and Spackman⁸⁹ using high voltage x-ray before recourse to surgery. Jussova, Czerny, and Geinisman⁹⁰ found x-ray therapy effective in some hypophyseal tumors but least efficacious in the ophthalmic group. Much the same conclusion was reached by Hambresin⁹¹ who advises such therapy but warns against accepting it as the treatment of choice or putting too much reliance on it.

Leucutia and Price⁹² differentiate between Mikulicz disease and Mikulicz syndrome, recommending radiation for the former given in divided doses rather than in a single massive dose.

When much is at stake as in bilateral retinal glioma, roentgentherapy often fails.⁹³

In filamentous keratitis Schall⁹⁴ found the affected eye more dry than the other. Actuated by the thought that lacrimation has something to do with filamentous keratitis he used roentgen treatment. The eyes became more moist and the filaments and disturbing sensation of dryness disappeared after one treatment. A recurrence subsided in one case after a second treatment.

Alcohol Injections

The advantages of novocain-alcohol injection for spastic entropion as pointed out by Hughes⁹⁵, are simplicity, painlessness, effectiveness, and permanence in the relief of this very annoying condition. The technique is simple, consisting of the injection of 0.2 cc. to 0.3 cc. of ninety-five percent alcohol into the outer portion of the orbicularis muscle of the lower lid near its attachment to the lateral palpebral raphe. Two syringes and one needle are required; one syringe for the novocain solution and the second for the alcohol, the needle remaining in situ after the novocain injection. The idea of alcohol injection is to produce a loss of function in about the lateral fourth of the muscle. If necessary the injection can be repeated in a few days. Pure grain alcohol must be used. No sloughing has been encountered.

Safar⁹⁶ injects 2.0 cc. to 3.0 cc. of

eighty percent alcohol into the deep muscular tissue at the temporal orbital margin for the relief of blepharospasm and spastic entropion. The alcohol is preceded by an equal quantity of four percent novocain solution.

Dudinov⁹⁷ has also made use of eighty percent alcohol injected into the skin of the eyelid for spastic entropion. There is considerable resultant edema. The results were good and the injection painless.

Weekers⁹⁸ found orbital injection of moderately concentrated alcohol of value in the treatment of painful eyes with vision. Success was attained without harmful effects. Use was also found for it in severe cases of corneal ulcer, hypertensive iridocyclitis, herpetic diseases of the cornea, etc. The method of two syringes and one needle is followed, employing novocain two percent for anesthesia and twenty to forty percent alcohol for effect.

For cases of epiphora which cannot be helped by other forms of treatment, Taratin⁹⁹ suggests the use of injections of alcohol, seventy to ninety percent, into the palpebral lachrymal gland as far as the bone of the orbit. The alcohol produces atrophy of the gland by mechanical destruction and compression of the tubules.

Unclassified

Excellent results with abrasion and rubbing in of oil of wintergreen have been claimed by Sabatzky in clearing corneal opacities. Friede¹⁰⁰ was unable to confirm this and disclaims any special faculty in oil of wintergreen of clearing corneal scars. Trials with other substances such as salt, oxycyanide of mercury, dionin, and thiosinamine were likewise unsuccessful.

Zubak¹⁰¹ uses electrocoagulation for pterygia. He employs a machine designed for electrocoagulation, fulguration, etc. The entire pterygium is not coagulated at one visit. The method has been in use for two years with good results.

The injection of a mixture of two parts of potassium ferrocyanide two percent and one part of sodium thio-

sulphate twelve percent, freshly prepared, as described and used by Weymann was employed by Tassman¹⁰² to clear up argyrosis. The marked clearing which followed was readily compared with the untreated fellow eye.

Some four years ago Wiener¹⁰³ made a preliminary report on the use of epinephrin in progressive myopia. With added experience he feels that epinephrin exerts a favorable influence in this condition. The rôle of age, habits, and asthenia are considered. Daily use of the drops for a year was deemed a fair test. To be considered successful the myopia must not show over 0.25 D. increase in a year.

The production of lasting beneficial effects from the ephemeral action of a drug like amyl nitrite seems improbable. However, this drug is recommended by Proksch¹⁰⁴ in such perniciously chronic affections as retinitis pigmentosa, myopia, and chorioretinal atrophies. Amyl nitrite is said to improve the light sense.

Treatment of alcohol-tobacco amblyopia with nitroscleran is reported by Pfimlin¹⁰⁵. Nitroscleran consists of from two to four percent sodium nitrite in physiological salt solution with admixture of small quantities of phosphates. It has a vasodilator action, and is given intramuscularly. The improvement in the tint of the disc following its use is attributed to the removal of the vascular spasm. It is contraindicated in cerebral arteriosclerosis.

The use of optochin by iontophoresis is held by Arruga¹⁰⁶ to possess distinct advantages in the treatment of hypopyon keratitis. Two milliamperes of current for two to four minutes is used. Superficial ulceration is said to respond to a single application. Deep ulcerations require one to three applications at intervals of forty-eight hours. Thin scars and better visual results are claimed.

Neuschüler¹⁰⁷ employs auto-aqueotherapy which consists in the subconjunctival injection of aqueous removed with a syringe from the affected eye. The theory upon which this is based is not convincing. In view of the fact

that paracentesis itself exerts a beneficial influence in hypopyon keratitis the claim of the author is robbed of much of its force.

A number of papers have appeared in the Russian literature bearing upon the open treatment of wounds of the eye, operative or nonoperative¹⁰⁸. This includes cataract extraction, strabismus operations, iridectomies, magnet extractions, and others. Secondary infections are no more frequent than when dressings are applied. A wire net or shield is thought to be sufficient. Economy in time and materials, a shorter postoperative phase, greater comfort of the patient, promotion of natural drainage, and maintenance of the normal temperature of the conjunctival sac are the advantages claimed.

Impressions

In cataract operations the classical capsulotomy procedure still holds its ground. The search for a safe intracapsular operation continues with the original Smith Indian operation apparently losing ground outside of India but still quite popular in that country. The Barraquer operation has few adherents. Knapp's procedure appears to be the safest and sanest for American patients.

In glaucoma an effort is being made to produce a filtration scar without the production of a large conjunctival bleb. Elliot's operation, described by many as easy of execution, is technically not so compared to other operations, if well and properly done. Iridencleisis used

by a few operators more or less during the past twenty-five years is claiming more and more attention and the next few years will probably see a great increase in its employment. The fear of incarceration of the iris has deterred many. Possibly the dread of sympathetic ophthalmia will prove to be without foundation.

Inasmuch as unselected simple and chronic glaucoma cases are unsatisfactory risks with any operation the results of Blaickner are probably better than appear on the surface. Improvement of vision and field cannot be hoped for in all cases and the maintenance of the statu quo must be considered a success. Any operation which will do this and reduce tension to normal in seventy-eight percent of the cases, must be acknowledged a good operation.

The Gonin operation is still too unsettled to be dogmatic about it. Time will tell if the reattachment is sufficiently permanent and satisfactory as to justify the hope reposed in it. In such a desperate and heretofore hopeless condition as retinal detachment there is everything to gain and little to lose in the performance of the Gonin or other operation of like intent.

The march of ophthalmology is slowly and steadily forward and there is no gainsaying the fact that the eyes of the people, taken as a whole, are now receiving closer scrutiny and better treatment than ever before.

Humboldt building.

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SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

COLORADO OPHTHALMOLOGICAL SOCIETY

May 16, 1931

DR. J. W. THOMPSON presiding

Pulsating exophthalmos

DR. J. W. THOMPSON reported the case of Mrs. L. D. R., aged forty-five years, who was first seen March 24, 1930. The eyeball had turned out and she had had double vision with pain in the right side of her head for three months. This had been more marked the last few days. The right eye had become swollen and prominent four days previously. There was no history of injury. Vision, O.D., 20/60?; O.S., 20/20?.

Upon examination one saw marked proptosis of the right eye. The veins of the upper lid were dilated and full, with venous congestion of the bulbar conjunctiva. The eye was turned out, adduction being limited to the midline. The cornea was clear, the pupil reacting promptly to light. The fundus examination showed the lower margin of the disc indistinct, with marked venous congestion throughout; otherwise the fundus was negative. There was a loud bruit heard over the right eye and the right side of the head. Blood pressure was 118/78, the urine was negative, and the blood Wassermann reaction was negative. The teeth were in bad condition. Ligation of the right internal carotid artery was performed March 28 by Dr. Ireland. Early in the evening the left arm showed paralysis, and the next morning the entire left side was paralyzed, so that she was unable to move the left arm or the left leg. Her mentality was dulled. She was discharged from the hospital April 6, 1930.

She had been seen again October 18, 1930. Vision, O.D., 20/30?; O.S., 20/30?. The bruit had disappeared, there was only slight proptosis, the ocular movements were good, and there was some congestion of the bulbar conjunctiva. The fundus showed slight venous congestion; the disc margins were distinct.

The paralysis of arm and leg had greatly improved.

Posterior lenticular opacity due to trauma (?)

DR. GEORGE H. STINE presented the case of Lee L., aged thirty-three years. On the afternoon of May 2, 1931, the patient had been sitting in his truck about thirty feet from a passenger train, which was passing by from his left, when he had suddenly felt a painful blow in the left eye. He had pulled a narrow splinter of what he thought was rusty metal from his eye.

Dr. Stine had seen the patient about an hour after the accident happened, and had found a puncture wound in the upper outer portion of the left upper lid, a horizontal linear perforation of the cornea near the upper limbus, with a large tear in the iris right under the corneal wound. Iris tissue was incarcerated in the wound. The anterior chamber had reformed. The pupil measured about 3 mm. in diameter, was regular, but did not react to light. The fundus details were hazy, but no gross pathology was made out. The eye was very painful and the vision badly blurred. Mercurochrome, holocain, and eserine were instilled and the eye occluded. Fifteen hundred units of tetanus antitoxin were administered. X-ray had showed no metal within the eyeball. The patient was kept in the hospital for three days with some improvement in his symptoms.

Upon examination with the slit-lamp in the office the next day, it was noted that the wound was flat and healing well. There was a faint deposit of rust-like substance on the margins of the wound. Except for a tear, the iris was normal. There were numerous pigmented cells in the aqueous. No perforation of the anterior lens capsule could be seen. The lens cortex and nucleus were clear, but there were fine fibrinous opacities of lace-like distribution on the posterior capsule. This

opacity had the appearance of a beginning rosette. It occupied the entire surface of the posterior capsule within the limits of the dilated pupil; its margins were crenated and sharply defined, and denser than the rest of the opacity. No vitreous opacities were seen through the clear periphery of the lens. Fundus details were generally hazy due to the lens opacity, and except for a small oval pigmented spot in the far nasal periphery, no abnormality was noted. At the end of a week, the anterior capsule began to show fine radiating striations with increased shagreen.

The tension being minus, atropin was used instead of eserine. The pain, tenderness, and photophobia gradually diminished under atropin, dionin, salicylates, iodides, and parenteral injections of boiled raw milk. The vision in the right eye was, 1.2+, and left, .08, which had remained unchanged.

The case was reported because of the rapid development of the posterior capsular opacity. The history and clinical findings did not show any evidence of preceding inflammation. The blood Wassermann reaction and x-ray of the teeth were negative. Dr. Stine particularly wished to know if any of the members had ever seen such a case, and whether or not the opacity might clear up.

Discussion. DR. EDWARD JACKSON said that it was possible for a lens to be temporarily partially clouded due to trauma, and that the change in this lens might disappear.

Old chorioretinitis

DR. OLIVER C. WISE presented Mrs. J. C. M., about thirty-five years old, who had no history of eye trouble until twelve years of age. Following scarlet fever she had been treated for her eyes stating that both eyes were sore. Diagnosis of trouble at that time was not procurable. The vision now was 20/200 O.D.; and 20/15 O.S. The urine was normal and the Wassermann reaction was negative. The personal and family history were irrelevant. In the right fundus there was a large white

area on the temporal side surrounded by a dark area extending towards the macular region.

Discussion. DR. D. H. O'ROURKE said that he believed the condition was congenital because the patient admitted to him that she had poor vision in that eye before she had "trouble" with the eyes.

DR. WISE said that the peculiar feature was that she was annoyed by the small amount of vision present.

Phthisis bulbi secondary to trauma

DR. HARVEY S. RUSK (by invitation) presented R. H., aged five years, who had injured her left eye a year and a half ago by scissors having entered through the lower lid into the globe back of the cornea. There had been some loss of vitreous, but the wound healed quickly. A traumatic cataract and complete loss of vision had remained.

In July, 1930, the left eye had become tender and inflamed. Upon removal of diseased tonsils and adenoids the inflammation had disappeared. On May 10, 1931, the eye was injured by a playmate's finger. There had been much pain and tenderness and mild fever for three days. Enucleation had been advised and patient had been sent to the hospital. There the eye had improved so rapidly that operation was postponed.

The left eye was totally blind, was soft, and the anterior chamber was filled with blood. The conjunctiva was moderately inflamed. The vision in the right eye was 6/6.

Discussion. It was the general consensus of opinion that the eye should be removed.

DR. GUY HOPKINS asked what effect the removal of the eye would have on the growth of the orbit.

DR. EDWARD JACKSON answered that the eye had most of its growth by the age of four years, and that removal of an eyeball after four years of age would have little effect upon the growth of the orbit.

DR. HARVEY S. RUSK thought it interesting that one attack of inflammation

had subsided after removal of the tonsils and adenoids.

Bilateral coloboma of retina and choroid at the macula (?)

DR. F. J. PEIRCE (by invitation) presented an apparently physically healthy eleven year old Mexican boy. The boy's mental age being six years, the school authorities had sent him for an eye examination to determine to what extent his poor vision might be a factor. The vision of 2/200 in the right eye was improved with a small correction to 20/100; the vision of 20/100 in the left eye could not be increased with any lens. The retina seemed absent in the macular area in each eye, leaving an irregular pigmentation through which small white patches of sclera seemed to be visible.

Discussion. DR. J. M. SHIELDS said that he had never seen a case of coloboma where there was so much pigmentation as in this case.

DR. EDWARD JACKSON said that it was difficult to say whether this defect was due to an early inflammation or to a coloboma. He believed that it was quite possibly due to some disease during fetal life. Dr. Jackson further thought that the brain had probably not developed properly, just as the brain and retina do not develop in cases of congenital cataract. He said to remember that a brain at fifteen or twenty years of age might do the developing that should have been done years before, so that this boy's prognosis mentally was not as bad as might appear.

DR. G. H. STINE mentioned a case of an old man who had led a fairly successful life with similar bilateral lesions in the maculae.

Unilateral exophthalmos

DR. G. H. HOPKINS presented G. P., a contractor aged forty-eight years, who had first come under observation September 4, 1930, with the complaint that three months previous to that time, while stroking his hand over his forehead, he had noticed that his left eye was more prominent than his right. He had never had any pain or disturb-

ance of vision in either eye. At that time the vision in his right eye was 20/20; left eye 20/30. The pupils were equal and reacted well to light. Media and fundi seemed normal in both eyes. The left eye was prominent, protruding considerably, although the lids could be closed over it. A slight spasm of the orbicularis muscle was noticed on complete closure of the lids. There was slight nystagmus in looking to the extremes of all directions, and there was slight restriction of motion on looking upward and outward, and downward and outward. Transillumination showed a distinct shadow in the left antrum, which suggested tumor. X-ray examination also showed cloudiness in this antrum. The antrum was opened by a surgeon in Denver on September 9, 1930, and found to be entirely normal. His urine was normal; blood count normal. His Wassermann and Kahn reactions were plus one. A basal metabolic rate showed plus 20.

Since that time the patient had been seen on two different occasions, and on February 3, 1931, his vision in this eye had been 20/30+, his fields had seemed normal, and the eye had appeared to be receding somewhat.

At the time of presentation the left eyeball protruded 5 mm. further forward than the right. There was marked pericorneal injection at the angles of the eye. There was a small corneal ulcer located near the limbus in the region of about "five o'clock". Vision was 20/30+. Mobility was good in all directions. There were beginning segmental lens changes in the lower portion of the lens. The fundus veins were slightly dilated, more so than in the right eye. There was no tenderness about the eyeball and no palpable mass was present. The exophthalmos was more marked than when first seen, and decidedly more marked than when seen two months ago.

The questionable diagnosis in this case in Dr. Hopkins' opinion was (1) lues, (2) unilateral exophthalmos due to goiter, (3) tumor in the orbit.

Discussion. DR. EDWARD JACKSON said that his first thought was of some ob-

struction of the venous outflow, possibly a malignancy. Nevertheless, he advised a course of antiluetic treatment before operation was attempted. He interpreted the beginning corneal ulcer as due to some interference with the function of the corneal nerves rather than to the moderate lagophthalmos.

DR. F. J. PIERCE said that one should remember that frequently unilateral exophthalmos occurred in goiter.

DR. J. J. PATTEE had seen the case six months ago and believed the exophthalmos was now greater. The corneal ulceration was an evidence of unfavorable progress of the condition.

Exophthalmos; arteriovenous aneurism

DR. G. H. HOPKINS presented L. C., a school girl, aged eighteen years, who had been first seen on December 27, 1930, with the complaints of poor vision in the right eye, double vision, and noises in her head. She had given the following history. On October 1, 1930, she was in an automobile accident and had received a laceration over her right outer eyebrow, a fracture of the skull in the same region, and a broken left wrist. She was semiconscious for several days. She had never had any previous trouble with her eyes and had never worn glasses. Following the injury her vision in the right eye was hazy, and about one month after the injury double vision began.

On this first visit she had a moderate exophthalmos of the right eye with marked distention of the veins of the eyeball, and a moderate fullness and tenderness along the upper orbital region. Vision in the right eye equaled 20/20; left eye 20/15—. The pupil in the right eye was slightly larger than the left and a trifle sluggish in response to light. The media and fundi seemed normal in each eye, except that a marked arterial pulse could be detected in the central retinal artery in either eye on pressure upon the upper orbital margin and eyeball. There was much restriction of movements of the right eye outward, due to a paralysis of the external rectus muscle. There was a defect in the lower nasal portion of the field of the right eye.

The urine was normal and the blood examination was normal. General physical condition was essentially negative, except for findings immediately about the eye. A loud bruit was heard over the right eye, left eye, right side of skull, and extending down the right side of the neck.

Under the treatment of rest, and potassium iodide and salicylates internally she had improved until at the time of presentation her right eye was only very slightly protruded. The veins of the eyeball were still prominent, but not as marked as heretofore. The fundus revealed no pathology, except a slight fullness of the veins and a marked arterial pulsation on pressure. A slight tenderness over the upper portion of the orbital contents persisted. A very faint bruit could still be heard over the right eye and at the base of the right side of the neck, but was no longer to be made out in any other region. The vision equaled 20/20 in this eye. External ocular movements were practically normal. The field defect in the lower temporal portion persisted.

Symptomatically the patient did not notice any more double vision, practically no pain in the eye, and was conscious of the noises in her head only in the very early morning. She was in excellent condition otherwise and apparently going to have a complete cure without operative interference.

Discussion. DR. WILLIAM M. BANE said he believed the diagnosis was correct, even though most such cases did not recover without operation. Dr. Bane reported a case of his own in which the pulsations could be palpated, but they could not be seen and no bruit could be heard. There was no history of trauma.

DR. G. H. HOPKINS asked whether vigorous exercise would be dangerous after such an operation.

DR. EDWARD JACKSON believed such exercise would not be contraindicated after a reasonable length of time, especially in young subjects.

RALPH W. DANIELSON,
Secretary

CHICAGO OPHTHALMOLOGICAL SOCIETY

DR. HARRY S. GRADLE, president

May 18, 1931

Primary xanthomatosis of the cornea

DR. DEWEY KATZ presented a male, fifty-five years of age, in whom the condition was more advanced in the left cornea than in the right. About six years ago the patient noticed a slight injection about each cornea; this was accompanied by slight photophobia and tearing, which had persisted to date. He was examined by Dr. Hiram Smith (Chicago) in 1927, at which time the corneal change suggested a very wide arcus senilis. The opacity in each cornea progressed centrally so that when first seen by the author the left cornea was opaque from limbus to limbus and the right cornea, except for a somewhat transparent kidney-shaped area in the upper nasal quadrant, was similar. Slit-lamp examination showed that the opacity was mainly in the middle and deep layers of the cornea. The superficial lamellæ which were not opaque contained many crystals of varying size and shape. In the deeper layers many of the crystals were needle-like in shape. Superficial vessels crossed each limbus at all meridians and extended for varying distances into the cornea. There was a number of deep vessels in each cornea, the vision of the right eye was finger-counting at two and one-half feet; O.S. light perception and projection.

At Dr. Smith's examination in 1927 the anterior chamber, iris and lens were normal. Both eyeballs were normal in size and shape and there was no limitation of ocular movements. Blood examination revealed an abnormally high cholesterol content.

Discussion. DR. HIRAM SMITH said that the condition seemed to quiet down for a long time, then suddenly flared up with increased pericorneal injection and increased deposition of gray deposits.

DR. THOMAS D. ALLEN said that Dr. William H. Wilder had seen this case which closely resembled the case of a

woman aged fifty-five years that had been followed about eight months. The lesion was not extensive, however. Dr. Wilder had Professor de Grosz look at the patient last year. He suggested medical treatment along the line of foreign protein, which was without result. Treatment with Prince's pasteurizing bulb had been tried several times a week, with some apparent improvement. Whether the heat from the pasteurizing bulb helped in the solution of fat-like bodies, if they were fats, was uncertain.

Congenital nonprogressive night-blindness

DR. GEORGE F. SUKER presented a male, thirty years of age, who according to his history had little interference with vision as a child, but as he grew older noted that vision was not normal, especially at night. Corrected vision O.D. was 20/24; O.S., 3/200. Examination showed an apparently normal fundus. There was a relative scotoma for blue and green in the left eye, which eye was highly amblyopic. This condition had been classified as a non-progressive hereditary and familial retinitis pigmentosa sine pigmentum. He had always been in good health except for some recent gallbladder trouble.

The symptoms of night-blindness appeared in the early teens. There were two types, that transmitted to men only, who were always myopic; and that transmitted to both men and women, always transmitted by a healthy female of the family. According to the literature, no post mortem study of this condition had ever been made, hence no one had ever been able to study the inherent pathology of the retina. The condition must be related to retinitis pigmentosa, and was therefore being treated on that basis with glandular extracts (thyroid and pituitary) and goodly portions of liver; also low dosage of x-ray seemed to check. This method of treatment had been found advantageous in cases of true retinitis pigmentosa.

As either condition was most often transmitted from an apparently healthy female to the male, it was thought that

Theelin, a female hormone, might be effective because it was not found in the male. Theelin was efficacious in treatment of hemophilia which also occurred more often in the male than in the female. Theelin (a Parke Davis and Company preparation) was as yet in the experimental stage for this type of retinitis and the usual retinitis pigmentosa.

Legal phases of industrial ophthalmology

DR. SIDNEY WALKER read a paper on this subject which will be published in the American Journal of Ophthalmology.

Discussion. DR. GEORGE SCHNEIDER said that if there were always agreement between members of the medical profession as to the effects of injury and the percentage of loss of use of the eye, there would be little left for lawyers to do in this class of work. The factor of negligence of an employee had been taken out of the law and the only thing for determination now was whether the man sustained an accidental injury arising out of and in the course of his employment. The law had fixed the compensation at 120 weeks, ranging from seven and one-half dollars to twenty dollars a week. The injured was entitled to recover for the loss of his eye, \$2,400, which was a small amount compared to the verdict of a jury in some cases. There was the advantage of the certainty in accepting the compensation.

A surgeon doing industrial eye work was confronted with many problems. For instance, in a patient with ten per cent vision remaining in one eye after an accident, opinions among doctors might differ as to whether or not the eye should be enucleated. If it was, the employer had to pay \$2,400. If the eye was not removed and sympathetic ophthalmia resulted, the individual was blinded for life. It required judgment to consider the salvation of the employer and the employee, and no one except a competent surgeon could exercise proper judgment in these circumstances.

Dr. Schneider emphasized a number

of other valuable suggestions in the proper handling of industrial work such as accurate records and greater cooperation between physicians and lawyers.

DR. G. R. McAULIFF said that industrial surgeons were really representatives of the company and safeguarded the interests of the company. Neutrality was impossible, but no doubt any doctor would lean to the side of the patient in the effort to see that he was treated fairly. Dr. Schneider's point in adjusting the fee to the status of the patient in industrial practice was well taken.

DR. HIRAM J. SMITH spoke of the handicap suffered by the loss of one eye in a workman. At present they were like many others out of work, but when industrial conditions change, the man with two eyes would be taken back, whereas the man with one eye would not. Would it not be better to provide some means of employment rather than pay \$2,400 for the loss of an eye?

DR. SIDNEY WALKER (closing) said that the matter of disfigurement entered into many of the claims, and frequently compensation was claimed not only for the loss of an eye but for disfigurement also. It had been ruled that a man could not collect for both. If disfigured about the lids no computation could be made as to the compensation he was entitled to. That rested with the commissioner or arbitrator.

The pathology and management of intraocular foreign bodies

DR. O. B. NUGENT read a paper on this subject which was published in the American Journal of Ophthalmology, v. 14, No. 12, p. 1236.

Discussion. DR. WILLIAM A. FISCHER in commenting upon Dr. Nugent's excellent presentation, spoke of one interesting phase which the essayist omitted, the method of removing the foreign body that had passed through the lens.

In a recent case following careful and adequate anesthesia the operation was begun by inserting a suture in the skin of the lids which was left loose; a suture was then placed in the superior

rectus muscle. The incision was made with a conjunctival flap followed by iridectomy. Two conjunctival sutures were placed, one on either side of the coloboma of the iris, and made slack for the exit of the lens. Blunt capsule forceps were used, as was done by Elschnig when removing a senile cataract by very slight traction, and pressure below as in the Smith operation. The lens and capsule were removed. The flap was turned down, the giant magnet applied, and the foreign body removed. The two conjunctival sutures were tied, the eye pulled down by the suture in the superior rectus muscle when the toilet was made. The lid suture was loosely tied to complete the operation.

The operation as performed by Dr. Nugent offered the same result as any senile cataract operation, with the added complications produced by a foreign body in the interior of the eye. The results of an operation performed in this manner would appear to be better than removing the foreign body first and the lens afterward.

ROBERT VON DER HEYDT,
Secretary

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

June 12, 1931

MR. ELMORE BREWERTON, president

Macular detachment in iridocyclitis

MR. EUGENE WOLFF said that as long ago as 1901 Fuchs drew attention to the fact that an edema of the macula might result from inflammatory lesions of the anterior portion of the eye. In cases of perforating injury with infection it could be seen that the disease of the posterior segment of the eye commenced with an extensive immigration of leucocytes from the retinal vessels, so that the inner surface of the retina might be covered by a purulent exudate, while its outer surface and the choroid might be normal. This purulent retinitis led to panophthalmitis, so

it seemed that the bacteria or their toxins had passed from the infected anterior portion of the eye through the vitreous and acted directly on the inner layers of the retina, producing in that way an intense leucocytosis. With a less intense toxin there might not be pus formation, nor even a wandering out of leucocytes, nothing more than a transudation of serum. With a still less intense toxin there might only be inflammatory edema at the macula, which was exceptionally vulnerable.

Why was the macular region so particularly vulnerable? Fuchs said that it was because of its delicate structure, while Iwanoff held that edema of the retina started in situations where the capillaries ended in circular anastomoses, on either side of the outer plexiform layer, at the ora serrata, in the neighborhood of the papilla and around the fovea centralis. Zeeman pointed out that the retinal venules at the ora serrata had at first a circular course, then bent radially toward the disc, and these venules received tributaries from behind. The outer layers of the retina were supplied by the choriocapillaris, and the retinal vessels only reached the outer side of the inner nuclear layer leaving the outer molecular layer between the two regions avascular, and so they were only slightly resistant to injury, and were very liable to degeneration. But it had also been suggested that the macula was most affected because the neuro-epithelium was almost next to toxin-containing vitreous, and the avascularity of the region rendered the absorption of toxins difficult.

One aspect of the subject, however, seemed to have received but little attention. In a paper (by Dr. Francis Davis and himself) which he recently read before the Ophthalmological Society he gave structural reasons for the special site of onset of papilledema, and for the distribution in the retina of the edematous fluid associated with papilledema. It was there suggested that the whole area drained by the central vein must contain an excess of fluid, the edema. The amount in each portion must depend on the density of the structure of the region in question.

The nerve fibers at the disc had a relatively loose arrangement, and much fluid would collect and produce obvious swelling, whereas the lamina cribrosa, with its dense meshwork of fibrous trabeculae, contained but little excess fluid in papilledema. Mr. Wolff suggested also that one of the most important factors in the vulnerability of the macula and its liability to be detached was the structure of Henle's fiber layer and its well-known tendency to swell.

Mr. Wolff suggested that in iridocyclitis and other inflammatory conditions of the anterior portion of the eye, the toxins or bacteria passed back into the vitreous, and came into contact with the whole retina. The macula would be especially affected, because the toxin acting here would produce a great accumulation of fluid in Henle's fiber layer. This fluid would remain unabsorbed longer than elsewhere, because of the vascular arrangements, which would be further embarrassed by the pressure of the fluid. The fluid would affect vision, not only by its presence in the region of more acute vision, but by pressure of the contained toxins on neighboring structures. At a later stage albuminous exudate might form between the neuro-epithelium and the pigment layer, and produce a true detachment. In two of the cases where this occurred, a true detachment was only present in the macular region.

But the macula might be affected from the choroidal side, though in the majority of instances this did not appear to be the case. Zeeman considered that the inflammation passed from the pars plana of the ciliary body directly into the retina, reaching the posterior portion of the eye by traveling back along the retinal vessels.

In all the cases in which there was a swollen macula there was an infiltration of leucocytes at the nerve head; this, with the accompanying inflammatory exudate, was probably responsible for producing traumatic or perforative papilledema, which could sometimes be noted during life.

Discussion. MR. E. TREACHER COLLINS remarked that unless the tissue fixation

was done very soon after enucleation, wrinkling at the back of the macula might occur, as it was a very early and prominent post mortem change. It was quite possible that such appearances might be an artefact.

MR. GAYNOR MORGAN asked whether the reader had had hypopyon ulcer investigated in this way. In many cases after hypopyon ulcer one got a very good view of the macula, and vision was very poor. If any case would answer this description of the passage of toxins from front to back, these would.

MR. WOLFF replied that it was very difficult to make a normal section of the outer fiber layer and of Henle's fiber layer. All the cases were fixed in Zenker's acetic immediately after the removal of the eye. He thought the cases mentioned by Mr. Morgan would do excellently for the purpose, but he had not looked for the appearance in hypopyon ulcer cases which had been excised.

(Reported by H. Dickinson)

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section of Ophthalmology

March 19, 1931

DR. H. MAXWELL LANGDON presiding

Bitemporal paracentral scotomata

DR. SHANNON reported the case of a man aged thirty-six years. Following serum injections of typhoid, dysentery, and cholera all in one day in September, 1929, he suffered from blurred vision and severe pain in the eyes. A diagnosis of glaucoma had been made and he had been given a weak solution of eserine.

Examination of his eyes revealed no abnormalities of the anterior segment. Tension by tonometer was 20 mm. in the right eye and 18 mm. in the left. The ophthalmoscopic examination was negative. With correcting glasses a vision of 6/6 was obtained in each eye. Form and color fields were within normal limits. A temporal paracentral sco-

toma was mapped out just temporal to the point of fixation in each eye. Fields taken at varying intervals for four months showed no change in the findings.

Urinalysis, blood Wassermann, and spinal fluid tests were negative. White cell count was 8,800. X-ray revealed several bad teeth. These were removed. X-ray of the skull by Dr. Manges was negative.

The diagnosis of small vascular lesions of the chiasm of toxic origin seemed justifiable. Lues of the chiasm which is frequently found in these bitemporal lesions was ruled out by the laboratory tests.

Pituitary disease was eliminated as the x-ray of the sella turcica failed to show any abnormalities and the scotomata failed to increase in size.

It was concluded that the small vascular lesions were either due to focal infection, abscessed teeth, or more probably the result of the serum injections.

Discussion. DR. DE SCHWEINITZ said that these scotomata were best explained by the presence of a small lesion in the chiasm at the position which the essayist had described, due to vascular obstruction, exactly as had been pointed out by Wilbrand and Saenger and by Traquair. The former authors believed that such a condition was due to syphilis, but Traquair in his reference to this matter stated that the vascular obstruction was "usually of syphilitic origin", and therefore he did not exclude other etiologic factors.

The visual field defects exactly corresponded to those which Wilbrand and Saenger had described, and were likely to be permanent.

DR. ZENTMEYER said that he would like to report a case in which there was binasal paracentral scotomata in association with hemichromatopsia. The patient, a woman, was seen at the Wills Hospital in 1890 and observed over a period of nineteen years. She was twenty-seven years of age, quite stout, married, and had two children. She had had some symptoms that suggested pituitary trouble with disturbance of central vision. At first the field was full for

form but there was a bitemporal hemichromatopsia. The field and vision remained unchanged for a long while but later a bitemporal hemianopsia for form as well as color, was present.

She was examined a great number of times, and ten years later developed binasal paracentral scotomata, larger than the ones described by Dr. Shannon. The case was extremely interesting and in view of the pituitary symptoms, this being before the day of the x-ray, Dr. Spiller thought that she probably had a growth. At the age of fifteen years she regained her temporal field in part, and central vision was improved from 6/15 to 6/9. The paracentral scotomata remained. She died of pneumonia and no post mortem was held.

The only explanation seemed to be that there was a lesion of the chiasm, and this growth had broken through the sella turcica, relieving pressure and in that way the physiologic block was removed.

Nonglaucomatous halos

DRS. JOHN T. CARPENTER and CHAPIN CARPENTER presented a paper upon this subject in which they said that halo vision was a prominent symptom of glaucoma. Its occurrence when glaucoma was absent was therefore of interest and there were not many references in ophthalmic literature to the nonglaucomatous halos.

Their differentiation was important, even though halos were infrequent as the sole indication of glaucoma. Col. Elliot and Treacher Collins had laid emphasis on this point. They were present when a mydriatic had been instilled, and were due to the endothelial layers of the cornea. Brundenill Carter reported similar phenomena in his own eyes, due to changes in the lens. Halos were seen after caustic applications to the lids, or when mucous was present in the conjunctival sac. Fogged spectacles also produced them, and they had been present in iritis. Incipient changes in the lens caused halo vision, particularly nuclear cataract due to the sclerosis. These halos were persistent in the cases

reported by the authors of this paper. Nonglaucomatous halos were smaller and less vivid than glaucomatous ones. Their size varied from four to eight degrees.

Elliot suggested a test originated by Emsley. If a halo was seen around a candle placed ten feet away, a card when passed vertically in front of the pupil, if glaucoma was present, would only reduce the intensity of the halo. In halo due to cataract, the opposite side of the halo disappeared entirely. The explanation of this was that the corneal edema in glaucoma was more or less uniform and through any part of the cornea the halo would be seen, while lens changes might not be uniform. Glaucomatous halos varied in occurrence with corneal changes, while those due to incipient cataract were constant.

Three cases were observed in which incipient cataracts of the nuclear type were present. Halo vision was constantly noted by the patients. The tension was found normal with the tonometer, fields were normal and the test suggested by Elliot proved the halos to be nonglaucomatous. Two patients were observed over a year without any alteration in the condition, except advancing lens changes.

The hazards of antifreeze methanol

MAX TRUMPER, PH.D., (by invitation) presented a paper upon this subject in which he said that automobilists and especially those working in service stations and in garages should know of a danger to which they might be exposed. This was the presence of wood alcohol used as an antifreeze mixture in radiators of cars and trucks. Many did not realize that antifreeze methanol or methyl alcohol was the chemical name for wood alcohol. The containers of methanol sold to the public under many trade names were not always labeled as poison. Automobilists had been further misled by labeling the product as a completely denaturized alcohol or as a 188 proof alcohol, omitting the word wood. The coining of a variety of trade names was an old method of obscuring

the presence of concentrated wood alcohol, the knowledge of which would impair its sale.

It was important to remember that both the new synthetic methanol and the old crude methanol were poisonous, the difference was that the latter, when evaporated from radiators contained obnoxious odors.

One should not overlook the dangers involved from its misuse as a drink. The U. S. Bureau of Mines recommended that "all antifreeze methanol be brightly colored" to avoid such misuse. Were methanol obtainable only in drug stores, it would be promptly included under the laws governing the sale of all poisons, especially because it had a taste and odor somewhat similar to grain alcohol. In this connection it was encouraging to note an opinion rendered by the attorney general of the state of Ohio which read "synthetic methyl alcohol may be sold in Ohio only by registered pharmacists".

Discussion. DR. E. A. SHUMWAY said that Dr. Trumper's paper was timely, as it called attention to the fact that methanol was a methyl alcohol preparation, but he doubted if its use in automobile radiators would be dangerous. The fumes would not get inside the cars to such an extent as to contaminate the air greatly. Drs. de Schweinitz, Tyson, and others had reported serious disturbance of sight in workmen shellacking the interior of large vats and Dr. Tyson had reported cases in which women had been affected while varnishing lead pencils. In all instances methyl alcohol or so called Columbian Spirits was present in the varnish, but lack of ventilation in the vats or rooms was an important factor. A number of cases were on record in which carbon monoxide poisoning occurred in closed cars in the winter season. The escape of the gas from leaky exhausts or defective heaters was responsible but he could not see that this could occur from a solution in the radiator.

Dr. Shumway added that the effect of methyl alcohol on the system was produced by the intermediate products of its decomposition before it was final-

ly oxidized. Ethyl alcohol was immediately reduced to CO_2 and water in the body, but methyl alcohol was first converted into formaldehyde and formic acid, which poisoned the organism, the one by interfering with the oxidizing efforts of the cells and the other by withdrawing oxygen from them. It had been shown, however, that the previous ingestion of ethyl alcohol still further prolonged the removal of the formic acid from the body, delaying at times the appearance of the visual disturbance and the fatal issue.

DR. DE SCHWEINITZ, after briefly referring to his own observations and others reported in the literature on methyl alcohol blindness due to inhalation aided by absorption through the cutaneous surfaces, pointed out that, so far as he was aware, in all these instances the subjects of this toxemia had worked where ventilation was entirely lacking. He agreed with Dr. Shumway that in the presence of proper ventilation it was most unlikely that visual disturbances due to inhalation would occur.

He referred to the researches of Ward Holden and Birch-Hirschfeld, who had attributed methyl alcohol blindness to nutritive changes in the ganglion cells of the retina. On the other hand, the retinal ganglion cells of dogs acutely and chronically poisoned by the administration of commercial methyl alcohol, during a rather elaborate research carried on at the University of Pennsylvania by Fewell, De Long and himself, failed to show even the slightest departure from the normal. Similar negative results were ob-

tained by Jonas Friedenwald and Feltz in Baltimore. Also, in all these experiments there had been at no time any evidence of blindness or ophthalmoscopic change.

In Schwarzkopf's experiments the animals exhibited no ophthalmoscopic lesions, but microscopically degenerated ganglion cells were found.

An effort to explain these contradictory results had been made by assuming that they depended on the kind of methyl alcohol employed, chemically pure methyl alcohol or commercial alcohol. Also the deleterious influence had been attributed to an admixture of fusel oil.

Henry Smyths, at the Laboratory of Hygiene of the University of Pennsylvania, however, failed to find any fusel oil in any of the methanols he used in his experiments, which were performed on guinea pigs with resultant definite retinal ganglion-cell changes.

The late Dr. Harold Gifford attributed the blindness to a simultaneous action of wood alcohol on the ganglion cells and the optic nerve, and Jonas Friedenwald had recently stated that this agent acted on the whole optic nerve.

Casey Wood and the late Dr. Frank Buller regarded methyl alcohol intoxication in human beings as a typical example of idiosyncrasy. Whether a similar idiosyncrasy existed among animals he was quite unprepared to discuss or maintain. Evidently the whole subject remained as an interesting field for further research.

A. G. FEWELL,
Secretary.

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GRADUATE STUDY IN VIENNA

The ninth special Course of Post Graduate Study in Ophthalmology in Vienna has been announced, to be given October 1 to December 6, 1932, at the Eye Clinics I and II of the Allgemeines Krankenhaus. Professors Mellor, Lindner, A. Fuchs, A. Schüller (Roentgen rays), O. Hirsch (Hypophysis and Sinuses), and Doctors Bachstez, Urbanek, Sallmann, Fischer and nine others, will take part in the teaching.

For the students "a preliminary knowledge of ophthalmology is presupposed," and "in refraction only advanced work will be given." The class is limited to seventeen, and applications are accepted in order of priority. The entire course is given in English.

This course has been taken by so many English-speaking ophthalmologists, that those who desire will be able to learn something of it from acquaintances, who have taken it in former years. It announces a total of 332 hours. Something of its character can be

judged by the assignments of time to a few of the more important subjects. Refraction and skiascopy with cylinders has 14 hours; and practical skiascopy with cylinders 8 hours; operations 10; histology 28; ophthalmoscopy 27; and also with red-free light 26; external diseases, under two teachers, 47 hours.

The greatest benefit from such a course will be received by those who have already worked in other clinics and in private practice devoted to this specialty. Graduate teaching is necessary in preparing to practice a specialty. The Vienna intensive course must be recognized as an established institution of importance for the graduate teaching of ophthalmology.

Edward Jackson.

NEUROLOGY AND OPHTHALMOLOGY

The deeper mysteries of the neurologic realm, even as they relate to the eye, are unexplored by most ophthalmologists. Without a clear mental pic-

ture of brain anatomy it is impossible for readers or listeners to visualize the parts and relationships alluded to in essays or lectures on this intricate borderland of medicine. Neurologists themselves are not always in agreement as to the anatomy and pathology of the brain, and as a matter of fact a great deal that has been written and believed concerning the related activities of different cerebral paths and centers is speculative and debatable.

Yet, even in the more imaginative territory of anatomic or pathologic possibility, and resting as such information may do upon rather flimsy bases of dissection, clinical experience, and examination at autopsy there are a number of details, which ought to be more familiar to the ophthalmic surgeon. Two important European medical organizations, at least, have recognized the community of interest between brain, eye, and ear, in that they professedly devote their gatherings and their official journals to all three departments. Perhaps no more useful field could be found for efficient teaching, in long or short graduate courses, including the instructional work of the American Academy of Ophthalmology and Otolaryngology, than the anatomy of the brain as applied to the eye, especially as regards the rarer and more intricate implications, and devoting very particular attention to the provision of adequate anatomical specimens or models helped out by drawings, photographs, or lantern slides.

In his Bowman lecture, delivered before the Ophthalmological Society of the United Kingdom in 1923, de Schweinitz discussed particularly those disturbances of the visual field which may result from special involvement of the arteries of the circle of Willis in pituitary disease or in arteriosclerosis. In that address as published will be found a series of valuable diagrams prepared under the supervision of J. Parsons Schaeffer, professor of anatomy and director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College in Philadelphia.

Interesting suggestions along similar lines are offered by Gordon Holmes

in a paper read this year, under the title of "Ocular palsies," before the Section of Ophthalmology of the British Medical Association. Holmes first points out that the chief reasons why the oculomotor nuclei and nerves are so frequently damaged by intracranial disease are to be found in the wide distribution of the nuclei in the brain stem, and the long and exposed courses of the nerves at the base of the skull. Isolated third nerve palsies after head injury may be due to small hemorrhages into the central gray matter of the brain stem, the explanation of such hemorrhages being "probably that the momentum of the flow sets up a wave in the cerebrospinal fluid of the third ventricle, which breaks with its greatest force against the gray matter around the anterior end of the aqueduct of Sylvius."

The importance to the ophthalmic surgeon of an intimate understanding of brain anatomy in relation to his specialty is illustrated by several allusions in Gordon Holmes' address. Abducens paralysis in otitis media, as suggested by Gradenigo, is probably due to spread of the infection along the air cells so as at last to involve the nerve where in its extradural course it passes the apex of the petrous bone. A similar pathological relationship occurs in some cases of ethmoiditis.

The external rectus palsy frequently found in cases of brain tumor may be attributed to "displacement backward of the brain stem, with consequent stretching of the nerve, which is held in position at its exit from the pons by the middle cerebellar artery around which it bends".

Arteriosclerotic cerebral vessels assume great importance. The sixth nerve bends sharply around the middle cerebellar, and it also lies so close to the basilar artery that it may be compressed when that vessel is thick and tortuous. The fourth nerve crosses the posterior cerebral artery, and the third nerve lies in the narrow space between the superior cerebellar and the posterior cerebral arteries at the point where the latter vessel leaves the basilar artery. The third, fourth, and sixth

nerves all run close to the internal carotid artery where it lies in the cavernous sinus.

There are few ophthalmologists who, in the course of a year's practice, are privileged to encounter more than even one or two cases in which these intracranial relationships have a bearing on diagnosis and prognosis. Nevertheless, it is advisable for each one of us to be alert to such possibilities, for upon our judgment may hinge decisions of great significance to the patient and those around him.

W. H. Crisp.

RECOGNITION TO CHIEF AND TO CLINIC

The European countries have borrowed so much from us financially that possibly we can borrow a bit from them in the matter of customs. The custom which I have in mind is used most frequently in Germany and Scandinavia. When an assistant in a clinic publishes an article from that clinic, there is usually included a phrase of thanks to the chief of the clinic for permission to use the material covered by the article and for the inspiration and assistance given by the chief. The latter part only too frequently has a note of servility that could well be omitted. But the custom has merit for it shows first where the man is working, second the character of work that is being done in that particular institution, and third the stamp of approval of the chief of the clinic. In other words, the clinic stands behind the man and his work.

In this country only a few clinics have the rather rigid discipline of the foreign clinics and as a rule, the assistants are on duty only part time. Consequently, the chief of the clinic does not know what the juniors are doing in other hours, and only too frequently is he surprised by the publication of his assistants. On the other hand, many clinical chiefs inspire some piece of work by an assistant and then participate in the glory of it by insisting upon a joint publication, although practically all of the work may have been done by the assistant.

So might it not be well to borrow a bit from that happy continental custom and let the young man have the hap-

piness and glory of his publication, with just an acknowledgment to his chief for the permission to utilize the material. Such phraseology indicates the stamp of approval of the clinic and at the same time makes public the workshop of the author.

Harry Gradle.

OPTICAL QUACKERY

The borderland of science, where startling facts have been discovered, but before their limitations, applications and implications have been worked out, is the prolific field for quackery. Astronomy and astrology both started in Babylonia 5000 years ago. They were not well separated in the minds of scholars, until Copernicus, Kepler, Newton, Herschel, and Fraunhofer had, by observation and study outlined the science of astronomy. The quack astrologer still advertises in our daily papers and more science must be taught in our public schools, before this form of quackery will cease to be profitable. Each important drug used in medicine has, at some time, been the chief ingredient of some nostrum. Electricity, x-rays, and radium have been similarly exploited.

It was not to be expected that glasses should escape the attention and false claims of the quack. For his discoveries in optics, Roger Bacon was charged with the practice of magic. Although glasses were used from his time on, they were sold largely on the false claims of quackery. But being used by some who by chance got benefit from them, they gradually established their value for myopia and presbyopia. When the astronomer Airy had corrected his own astigmatism, and Donders had proved that asthenopia, headache, amblyopia, chronic inflammation and squint, might arise from hyperopia, the marvelous cures of some patients by wearing glasses opened a wide field for quackery, that proved very attractive. Educated physicians working with glasses have done much to determine the scientific basis and limitations of their usefulness. But there is still such wide popular and professional ignorance of facts that glasses as well as the "patent medicines" can still serve the

purpose of quackery. The attempt to establish a profession of optometry, that professed to cure disease or deformity without any knowledge of anatomy or pathology, is failing. The claims and methods of optical quacks have extended the sale of glasses, and are still resorted to by those who seek to grow rich by mass production and advertising.

The so-called patent medicines are alleged medicines of secret composition, advertised and sold under a copyrighted name. Glasses can be sold in the same way, and the opportunities to make this profitable have attracted the attention of men who have talents for big business. Glass of secret composition, sold under a copyrighted name finds many buyers; ignorant of optics, but obsessed by the fear of too strong light. A "physician," who had worn colored glasses many years, came wearing two pairs of the darkest glasses he could get, supplemented by a black silk handkerchief tied over his eyes; which he insisted on wearing, even in the dark room; so strong was his superstitious illusion about the danger of light to the eyes.

It is to be feared that many, otherwise educated, oculists foster this traditional superstition by their readiness to prescribe dark glasses, at least if any mydriatic has been dropped in the eye. It should be ranked with the superstitious fear of cold and drafts, as a failure to discriminate between normal and pathologic reactions to stimuli. Most buyers of glasses know nothing, and many who prescribe and sell glasses know so little, about mathematical optics; that the calculation of curves of "coflexures" of lenses, remains an imposing mystery. This offers a fine opportunity for quackery. Many thousands of dollars have been spent in advertising the alleged merits of lenses ground on new formulas, and sold under copyright names. Dealers in glasses are favorably disposed to them by what they share of the increased price. Perhaps even the managers of great optical companies believe these improved coflexures are a benefit to the public; as well as to themselves, who have paid a mathematical expert to make the

calculations, on which their copyright has been obtained.

In this situation the eye physician who prescribes glasses is about the only one who can protect the interests of his patients. It becomes his duty to learn for himself something of ophthalmic optics, and to pass an honest judgment on the advertised claims that are put forward by interested parties. The leading ophthalmic surgeons of former generations knew nothing of such niceties regarding glasses. But that does not give the ophthalmologist of today who prescribes glasses, any right to neglect to give consideration to what affects his patients' interests.

Edward Jackson.

PROGRESS IN OPHTHALMOLOGY

In this number of the Journal is published the annual lecture on Progress in medical and surgical treatment in ophthalmology, delivered before the American Academy of Ophthalmology and Otolaryngology in September. These progress lectures have become very interesting features of the program. What could be simpler for us than to have the current literature thus reviewed. The continually increasing pressure of competition has turned most of us from the leisurely enjoyment of book-browsing to the hasty scanning of tabloids in order that we may keep even with the kaleidoscopic events in our fast changing world. Annual progress papers give us just the condensed information that we crave.

Now that a business depression is freely admitted by all, thoughts have turned to find if there be any Balm in Gilead. Perhaps this will be found in increased (even if involuntary) leisure, more opportunity to enjoy some very good things that life offers: books, conversation and contemplation. Perchance we shall undertake those long-postponed research problems. It is to be hoped that we shall be less apt, at our backs to hear "Time's winged chariot hurrying near." Anything that will stop our senseless haste will not be entirely devoid of virtue. Prepared entertainment may languish a little and the art of thinking and talking of some-

thing other than business may come into vogue again. But until this leisure comes we still want our literary pills to be sugar coated and this coating has been very well applied in these progress papers. It is unfortunate that they are relegated to the end of the five day meeting because so many members are thoroughly tired before that time and have departed, leaving only a handful to listen to the result of many hours of painstaking effort on the part of the essayist. Obviously some one must occupy the undesirable concluding places on the programs and as recent innovations these papers could scarcely be moved to more advantageous positions. However those who remain to hear them are well repaid. In them will be found most of the subjects of greatest current interest to the ophthalmologist and from the perusal of them he will get an excellent idea of the ophthalmic happenings of the past year.

Lawrence T. Post.

ASSISTANT EDITORS

The editor wishes to announce to the readers of the Journal that Dr. B. Y. Alvis of Saint Louis has been assisting in the preparation of manuscripts of original articles for publication in the Journal during the past seven months. Dr. Alvis will continue to assist in this way. Dr. H. Rommel Hildreth of Saint Louis is aiding in a similar manner in the department of Notes, Cases, Instruments.

Lawrence T. Post.

BOOK NOTICES

Opticks: or a treatise of the reflections, refractions, inflections and colours of light. Sir Isaac Newton, Knt. With a foreword by Prof. Albert Einstein and an introduction by Prof. E. T. Whittaker, F.R.S. McGraw-Hill Book Co. New York, 1931.

This is a reprint of the fourth edition of Newton's Optics; published in 1730, three years after Newton's death, and containing his last additions and corrections. The first edition of the book had been published in 1704, but an im-

portant part of it had been read before the Royal Society in 1672 and published in its Transactions. The page of "foreword" shows Einstein as a historian and poet. It begins: "Fortunate Newton, happy childhood of science! He who has time and tranquility can by reading this book live again the wonderful events which the great Newton experienced in his young days. Nature to him was an open book, whose letters he could read without effort".

The introduction gives interesting history of Newton, and of the theory of light and allied radiations. Newton preferred mathematics and experiment, to hypotheses set forth in the name of philosophy. His interest in optics turned first to grinding lenses and construction of telescopes. He began: "My design in this Book is not to explain the properties of Light by Hypotheses, but to propose and prove them by Reason and Experiments". Many of his experiments are still among the best we have to teach and illustrate optics.

This book is the best, to give the ophthalmologist a personal contact with Newton and his work. He was great as a mathematician; but he sets a good example for mathematicians of our own day. Many, who have tried to write on optics, have concealed their practical and important ideas behind a smoke screen of algebraic formulas, when they thought they were making a mathematical demonstration. Newton is a worthy predecessor of Helmholtz and Donders; and any one really interested in ophthalmology will do well to have this book, and go to it often for serious reading.

Edward Jackson.

A pocket atlas and textbook of the fundus oculi. By J. Lindsay Johnson, 215 pages, with numerous illustrations in the text by the author and 54 colored drawings selected from the author's cases by Arthur W. Head. Second edition, revised and enlarged, bound in cloth, price 12s. 6d. net. Adlard and Son, Limited, London, 1931.

This little book (whose form really fits its title, since it can be carried easily in a coat pocket) received a very cordial reception when the first edition

was published in 1911. It was reprinted in 1928, and has been revised and brought up to date for this second edition. On the whole it is a valuable publication, especially for the novice in ophthalmoscopy and retinoscopy. The exceptionally fine drawings by Arthur W. Head, Fellow of the Zoological Society, will compare favorably with those in any atlas of the fundus, and they are very well printed. In the present edition two chapters have been added, one on the various forms of cataract, and one on the vitreous. No one will criticize the author for not including a consideration of the slitlamp, since that apparatus is beyond the main scope of the volume and is dealt with adequately in special works on the subject.

Although the preface is dated July, 1931, and although Professor Gullstrand died in 1930, it is stated that the slitlamps put out by the firm of Zeiss are constructed under the supervision of our lamented Swedish colleague.

The title page is another poor place for manifest errors of statement, and it is odd that the author and publisher should not know better than to inform the public that Mr. J. Lindsay Johnson is "Fellow of the American Society of Ophthalmology and Laryngology". Presumably the American Academy of Ophthalmology and Otolaryngology is intended. The text of the volume is not altogether sufficiently free from rather sloppy examples of syntax and grammar. In spite of minor criticisms, however, the author's very painstaking explanations in simple direct language of the workings of the ophthalmoscope and retinoscope are excellent and are especially well suited to the kind of student who seeks self-improvement by way of the printed page. The volume is very well produced on good paper, and is strongly and flexibly bound.

W. H. Crisp.

Pacific Coast Oto-Ophthalmological Society, Transactions 1931. Paper, 8vo, 220 pages, illustrated. Published by the Society. J. Frank Friesen, secretary. Los Angeles, 1931.

The Nineteenth Annual Meeting of the Society was held May 28 to 30; and within six months this good account of its proceedings is distributed to 326 members. Over half the volume is devoted to otolaryngology; but there are 67 pages of papers and discussions devoted to subjects pertaining to ophthalmology.

The subjects and authors of the papers were: Operation for Congenital Cataracts, Dr. Otto Barkan; Aftermath of Intraocular Foreign Bodies, Dr. Frederick A. Kiehle; Choroidal Detachment Following Cataract Extraction and Trephine Operation, Dr. Joseph L. McCool; Dystrophy of the Corneal Epithelium, Dr. Luther C. Peter; and Results in Monocular Esotropia by Dr. Peter. These papers were discussed by twenty active ophthalmologists, whose discussion brought out many important phases of these different subjects.

Edward Jackson.

Kurzes Handbuch der Ophthalmologie

(Short handbook of ophthalmology), by forty-seven authors; edited by F. Schieck of Würzburg and A. Brückner of Basel. Fourth volume, "Conjunctiva, cornea, sclera, injuries, occupational diseases, sympathetic disease, ocular pressure, and glaucoma". By E. Cramer, H. Köllner, W. Reis, F. Schieck, and R. Thiel. Large octavo, 874 pages, 463 illustrations (many colored). Price of this volume, paper covers, 165 marks, bound 169.60 marks. Verlag von Julius Springer, Berlin, 1931. (Reviews of the three previously published volumes of this series will be found on pages 443, 540, and 1012 of volume 13 of this Journal.)

In the present volume there is every evidence of consistent purpose and thoroughness in the preparation of the whole work. One is disposed more and more to wonder why it was ever called a "short handbook" and who the practical joker was. In view of the prices of these volumes one is led to doubt whether it is bought at all widely by private physicians. Perhaps wealthy German physicians can afford to pay

what amounts to \$42.00 for a single volume in paper covers, but it is to be doubted whether many among our relatively impecunious American specialists are likely to contemplate such an expenditure! (This in reply to a German colleague who a year or two ago, in public meeting, ventured to question whether certain expensive articles of equipment were within the reach of any nationalities other than the "rich English and American".) The new volume is again most sumptuously illustrated, including a large number of colored reproductions, beautifully printed. Usually the illustrations are extremely well planned for their purpose, although occasionally, as with the small illustration of keratoconus on page 242 (cone shown above the middle of the cornea) the general accuracy is less acceptable.

In the chapter on conjunctiva and cornea, examples of especially careful work are to be found under subheads relating to vernal catarrh, tumors, and parenchymatous keratitis. The chapter on injuries and occupational diseases, including compensation, is likely to be consulted as authoritative, although the bases of claims vary disconcertingly between one country and another, and one questions whether most discussions of this kind are not directed very largely to holding the financial returns for physical disability at the lowest practicable figures.

An excellent example of the value of the illustrations in this work is the series, shown on pages 532 and 533, of photographs of the same case of lime burn at different stages.

The three admirable final chapters of this volume are on sympathetic diseases of the eye (76 pages), the physiology and pathology of ocular tension (35 pages), and glaucoma (143 pages).

Two of the authors whose names appear on the title page of this fourth volume, E. Cramer and H. Köllner, have died since the "short handbook" was undertaken.

W. H. Crisp.

1. **Professionalnaya patologiya glaza** (Occupational pathology of the eye). A. J. Samoilov, Editor. Vol. I. 76 pages, 1929. Obuch Institute

for the Study of Occupational Diseases, Moscow. Published by Izdatelstvo Moszdravotdyela, Tsenter, Kuznetski Most No. 12.

2. **Pervoye vsesoyuznoye sovyeshchaniye po voprosam vrachebnoi ekspertizi** (First all-union conference on problems of medical expert opinions of disability). Papers and resolutions. Narkomzdrav R.S.F.S.R. and Uk.S.S.R. 196 pages. 1928. Published by Izdatelstvo "Naoutchnaya Misl," Kharkov.
3. **Trudi leningradskovo instituta po izutcheniyu professiona'nikh zabolyevanii** (Papers of Leningrad Institute for the Study of Occupational Diseases). N. A. Vigdortchik, Editor. Vol. I, 360 pages, 1926, Occupational diseases of boiler makers working with pneumatic tools. Vol. III, 230 pages, 1928, Collected expert opinions in occupational and traumatic disability. Vol. IV. 400 pages, 1929, Attempt at a comparative clinico-statistical study of occupational pathology. Published by the Institute, Leningrad, 2 Sovyetskaya No. 4.

Medicine in Soviet Russia, with its government by labor for labor, is social rather than clinical and preventive rather than curative. The volumes under review reflect that trend and the tendency toward stock taking of its problems. Of principal interest to ophthalmologists is the first volume. The result of three years of work and a study of over a thousand eyes exposed to the constant impact of metal dust has been the demonstration of a specific occupational corneal anesthesia, present to the extent of 92 percent among lathe workers (turners). The quantitative study was made possible by the use of a specially devised set of three calibrated woman's hairs, to represent pressures of 10, 1, and 0.3 gm. per sq. mm. The anesthesia was found to be independent of corneal scars (present in 20 percent of the workers), absent in a control group of workers exposed to atmospheres heavily laden with nonmetallic dust of coal and earth,

and not related to drying of the cornea as shown by a control group of tobacco workers. Intravital staining with methylene blue and neutral red and slit lamp microscopy gave the clue to the pathogenesis of the anesthesia. A widespread microscopic necrosis of surface epithelium was noted and a striking diminution of the number of "nodes", regarded as end organs of the nerves, was observed. These and the minute xerotic dimples found make a picture analogous to a lesion of the trigeminus, and are explained as the result of the bombardment of the sharp metal particles against the cornea. The condition explains the disproportionate results from insignificant trauma noted among the workers, their failure to react to and report the presence of foreign bodies, and the high incidence of eye injuries— $\frac{1}{3}$ of all injuries. That protective glasses alone are not a sufficient measure and that of more importance is a system of exhaustion of the metal dust particles is the lesson derived from this study. Other papers deal with the minimal visual acuities found compatible with the performance of various industrial tasks, for the purpose of vocational guidance and industrial selection.

The outstanding feature of interest in the papers and resolutions adopted at the first all-union conference on problems of medical expert opinion of disability held in 1928 is the almost unanimous rejection of the "percentage" system of determining loss of earning capacity as used by us and generally throughout Europe, in favor of the "group", also called the "rational" system. The "group" system is an attempt at classification of disabled individuals on the basis not only of functional loss sustained, but of occupation, age and general economic situation the individual has to face. The "percentage" system, borrowed from the West and introduced in 1921, when the New Economic Policy involving a new, hired status of labor was adopted, was dropped in 1925 for the "group" system. This system operates with six groups of permanently disabled workers.

Group 1 includes those totally dis-

abled and helpless, necessitating some one to care for them and is entitled to 100 percent of their wages. Group 2 is composed of those disabled from following any occupation, but not helpless and receives so-called full pension, or two-thirds of wages. Group 3 comprises those capable of irregularly following their previous occupation with an allowance of 75 percent of "full pension". Group 4 is of those disabled from following their previous occupation but capable of following a less remunerative occupation, and these get 50 percent of "full pension". Group 5 is made up of those disabled from following their previous occupation but capable of rehabilitation for a new occupation, and gets 20 percent. Group 6 is composed of those who have suffered a reduction of earning capacity at their normal occupation up to 15 percent and gets that amount. Social insurance covers not only industrial injuries and occupational disease but disability arising from any cause, and the problem of causal relation occupies a much more secondary position than it does with us. The mechanical conversion by equivalents of the "percentage" system into the "group" system led at first to absurdities, such as putting men who lost their left arm into the third group and those who lost a right arm into the second, because of a 10 percent difference in the old system. It seems obvious from the papers read at the conference that the "group" system is not fool-proof, is more complicated, requires more skilled and longer trained medical experts to handle than the "percentage" system. There is a tendency noted to simplify it by reducing the groups to three, and incorporating the lower three groups into the third group of partially disabled.

The tables offered by Nathanson in his paper, "Some Problems in the Expert Examination of Eye Defects", are particularly elaborate. Not only is the "group" system followed, but a classification is attempted with reference to the six functions of the visual apparatus: visual acuity for distance, visual acuity for near, peripheral vision, binocular vision, color vision, and light sense. Each

function is separately evaluated in accordance with occupation. Industrial blindness is regarded as beginning between 20/200 and 10/200 depending on occupation. Similarly for industrial purposes 20/40 to 20/70 is regarded as normal vision. The loss of one eye is compensated for in terms of vision of remaining eye, and as a loss of $\frac{1}{6}$ of peripheral vision and of binocular vision, and is classified in the fourth, fifth or sixth groups, depending on occupation, need for artificial eyelid deformity and so forth. The worker has the right to refuse enucleation, and is compensated for sympathetic ophthalmia if it arises. Progressive myopia in people who work at close range is considered an occupational disease.

In dealing with traumatic neuroses Grinstein advocates as a prophylactic measure early return to industry, treatment in special sanatoria, and small compensation when this fails, and in somatogenic postconcussion cerebrospinal syndromes, on the contrary, longer rest after injuries, and higher compensation in view of poor prognosis.

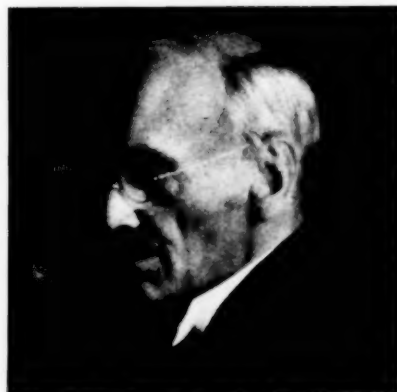
Of the Collected Expert Opinions of the Leningrad Institute a large number deal with traumatic neuroses. Fourteen out of 18 cases followed head injuries. Ten cases were injuries accompanied by loss of consciousness, and 50 per cent showed repeated traumas in the past history, not necessarily occupational. This, in the opinion of Vigdortchik, is hardly a coincidence, and suggests a chronic progressive condition with the last trauma acting as the final straw.

Occupational cataracts, due to exposure to radiant energy, are diagnosed if exposure has been for more than five years, if person is less than 50 years old, and in the absence of other etiological factors.

Interesting data are contributed by Alenitzin in Vol. 1 of the Leningrad Institute papers. In a study of boiler-makers, 67.7 per cent were found with corneal scars, the longer the period of employment the greater the percentage, and, independently of duration of employment, the older the individual the more scars in the pupillary zone. Scars follow injuries with greater probability

than in the young. On the other hand a very high prevalence of chronic conjunctivitis was noted by Alenitzin in the groups of workers studied in Vol. 4.

M. Davidson.



EDWARD JACKSON

This picture of Dr. Edward Jackson was made from a painting by J. I. McClymont. The cost was met by a number of Dr. Jackson's friends and admirers, both inside and outside of Denver.

The presentation of the painting was made on October 6 at a dinner meeting of the Medical Society of the City and County of Denver. On behalf of the donors Dr. Robert Levy made the presentation to the Board of Trustees of the Society. Dr. Samuel Childs, on behalf of the Board of Trustees, accepted the portrait.

The president of the Society, Dr. J. W. Ames, presided at the dinner and presented the speakers. Dr. Jackson was pointed to as a man who had devoted his life not to making money, but to unselfish devotion to the highest ideals in medicine.

CORRESPONDENCE

The following note was recently received from Dr. Dorland Smith. It contains an abstract of his method of cyclodamia as published in the Journal, Vol. 14, p. 498.

"While it is of course necessary to understand thoroughly the principles of efficient accommodative control by over-correction, the details of obtaining it, and the necessity for the special and unusual methods of cyclodamia in order to use it reliably, the methods themselves in order of their use are as follows:

1. Reliable measurement of corneal astigmatism by Meyrowitz keratometer.

2. Rapidly alternating skiascopy of both eyes under ample overcorrection and with distant fixation, not only to correct corneal to total astigmatism, but to promote full ciliary relaxation and to record the total error thus revealed.

3. Record of the total error in both eyes revealed by overcorrection to just 20/200 vision. (Also to 20/40 vision, though this is less important).

4. Record of the total error in both eyes revealed by bilateral fogging and 20/20 or 20/15 vision.

5. Determination of the prescription for glasses by judicial comparison of records 2, 3, and 4, with proper allowance for accommodative anomalies observed, and with final determination of the exact astigmatic correction by cross cylinders.

6. Determination of the general reliability of the examiner's use of cyclo-damia by cycloplegic check in every doubtful case.

For those who are not yet ready to make any material change in their present methods of noncycloplegic refraction, occasional serious mistakes may be avoided and much food for thought afforded by determining the addition to the prescription about to be given, which is necessary to bring vision to just 20/200 in both eyes. Addition of materially more than +1.50 D. Sph. indicates the need of better non-cycloplegic methods or the use of a cycloplegic."

The following letter was recently received by the editor: "The medical profession of Butte are desirous of having lectures on surgical, medical and scientific subjects, to supplement our rather limited library and clinic facilities.

"As you are aware, we are far removed from educational centers, and have limited opportunities as compared with those of the profession living near the larger cities. We would probably be unable to induce leading teachers and lecturers to make us a special visit, but if we knew when men of note were coming West, we might be able to induce them to come to Butte and spend a day or two with us.

"Is there a bureau in your organiza-

tion through which we might be informed of contemplated trips, long enough beforehand for us to enter into communication with, and arrange for stop-overs?

"Any assistance you can give us will be greatly appreciated.

"(Signed Dr.) Peter Potter"

The Journal does not conduct such a bureau, but if any who are passing through Butte would remember this invitation I am sure they would be warmly welcomed.

OBITUARY

Dr. L. Webster Fox

Dr. L. Webster Fox, who died June 4, 1931, was born at Hummelstown, Pa., March 19, 1853. He graduated from Jefferson Medical College in 1878. After graduate study in Vienna, he served as clinical assistant at the Moorfields Hospital, London; and, on his return to Philadelphia, became clinical assistant in the Jefferson Medical College; and in 1893 professor of ophthalmology in the Medico-Chirurgical College. On the merger of the latter institution with the University of Pennsylvania, he was made professor in the Graduate School of Medicine in the University. In 1886 he assisted Dr. George M. Gould in the preparation of a quiz compend and in 1904, published his Practical Treatise on Ophthalmology. He was eminent as an operator and clinical teacher. His reports of Eye Clinics, published in five volumes (see Amer. Jour. Ophth., v. 12, p. 927; v. 13, p. 1110) included a wide range of interesting cases, reported with sufficient detail to make a valuable work of reference. Operative skill and universal courtesy were his outstanding characteristics.

Edward Jackson.

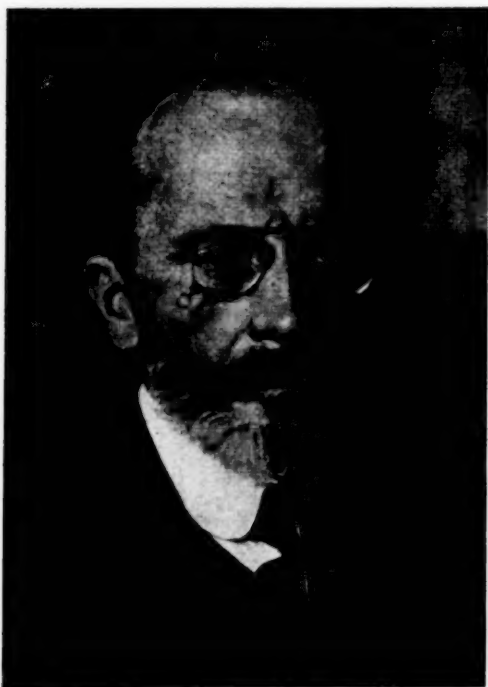
Otto Haab

(Passages selected from a notice by Alfred Vogt in the Klinische Monatsblätter für Augenheilkunde, November, 1931.)

Otto Haab of Zürich, Switzerland, died on October 17 in his eighty-second year, after a long illness. Haab is internationally known for his work in magnet extraction of foreign bodies from the eye, for his splendid atlases of

ophthalmology, for his teaching, and for numerous contributions to periodical literature.

Much of his early scientific training and technique was derived from contact with Friedrich Horner, a pupil of Albrecht Graefe. He was a man of ex-



OTTO HAAB

act observation and demanded precision of his pupils, each of whom was required to combine drawing with careful use of a loupe and condensing lens. He knew from his own experience and often declared that only by drawing do we detect fine details which escape mere inspection.

One of the characteristics of Haab's technique was his complete knowledge of direct ophthalmoscopy, which is often less thoroughly employed by European ophthalmologists than the indirect method. Upon the basis of this method he was able to offer accurate description of important pathological findings in the macular area, especially senile macular disease and traumatic hole at the macula.

Readers of his three atlases are familiar with his simple and clear style,

free from all circumlocution, and many have profited by his chapters on ophthalmoscopy and refraction. His gift of plain and direct statement was manifested in a number of volumes written for the layman.

In his earlier years he wrote a number of essays on general topics of pathology, mostly of experimental nature. As regards the eye he was particularly interested in the pathology of iridocyclitis, obstruction of the central retinal vein, and diseases of the central artery. He was author of the section on pathologic anatomy of the eye in Ziegler's textbook. He also devoted himself to problems of bacteriology, particularly in connection with ophthalmia neonatorum and panophthalmitis.

His most important achievement was perfection of the magnet operation by means of the giant magnet which bears his name (1892-1894).

His color drawings for the atlases of ophthalmology show a great deal of artistic skill in this restricted field. His sense of form and art also displayed itself in the design of the Zurich eye clinic (about the middle of the nineties).

His personal characteristics corresponded with the qualities displayed in his scientific pursuits. Outstanding was his inflexible love of truth, in regard to which he yielded to no personal considerations. As an operator he insisted upon exact diagnosis and careful prognosis for each intervention, and he attained international fame as diagnostician and surgeon. His pupils included a number of the most prominent among European ophthalmologists, one of whom, J. Streiff, recently published a Festschrift to commemorate Haab's eightieth birthday, under the title of "The work of Professor Otto Haab".

(Contributed by W. H. Crisp).

ERRATUM

On page 1120 of the November issue of this Journal, in Table 2, the last item in the first column showing the percentage increase in size of the blind spot for blue as compared to that for form stimuli should be 33 percent instead of 3 percent.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

- | | |
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| 1. General methods of diagnosis | 9. Crystalline lens |
| 2. Therapeutics and operations | 10. Retina and vitreous |
| 3. Physiologic optics, refraction, and color vision | 11. Optic nerve and toxic amblyopias |
| 4. Ocular movements | 12. Visual tracts and centers |
| 5. Conjunctiva | 13. Eyeball and orbit |
| 6. Cornea and sclera | 14. Eyelids and lacrimal apparatus |
| 7. Uveal tract, sympathetic disease, and aqueous humor | 15. Tumors |
| 8. Glaucoma and ocular tension | 16. Injuries |
| | 17. Systemic diseases and parasites |
| | 18. Hygiene, sociology, education, and history |

4. OCULAR MOVEMENTS

Clausen, W. **The significance of fusion in the correction of strabismus, with remarks concerning the management of strabismus.** Arch. f. Augenh., 1931, v. 105, Oct., pp. 187-207.

This paper, which does not lend itself to abstracting, discusses at length the fusion sense and its importance in the management of strabismus. The author feels that fusion exercises between the years of four and six years often lead to restoration of binocular stereoscopic vision. In adults, even after surgical correction, stereoscopic exercises rarely succeed in establishing this function and then only when the patient carries out the exercises carefully over a very long period of time.

Frederick C. Cordes.

Gala, A. **Progressive nuclear external ophthalmoplegia.** Oft. Sbornik, 1930, v. 5, pp. 186-187.

A female, aged twenty-two years, with negative family history, for seven years had lacrimation following catarhal dacryocystitis. Since her fourteenth year she had developed an increasing inability to lift her lids and within the past year she had lost the power of moving her eyes. Present condition: Head bent backward, bilateral ptosis, palpebral fissure narrow, eyebrows raised, brow in folds; eyeballs

almost completely immovable, the left in a slight position of divergence; pupillary action negative; chorioretinal changes in the region of the macula and at the periphery; vision: R. 6/8, L. 6/12; peculiar expression of face, owing to the bilateral facial paralysis; no other nerve pathology; nose and throat negative; urine and blood Wassermann negative. Hepatic function is as in atrophic cirrhosis of the liver, with abnormally prolonged glycemic curve, and no retention of biliary pigment. (Bibliography.) *G. D. Theobald.*

Jaensch, P. A. **Bilateral trochlear paralysis as the only manifestation of a pineal tumor.** Zeit. f. Augenh., 1931, v. 75, Aug., p. 58.

Bilateral trochlear paralysis without involvement of other ocular nerves has been reported only six times. The author diagnosed this condition on the basis of the relative position of double images in the cardinal directions, and he analyzes his findings minutely. The etiology, tumor of the pineal body, was made clear at necropsy.

F. Herbert Haessler.

Jaensch, P. A. **The clinical aspect of supranuclear paresis of the internal rectus muscles, and of internuclear ophthalmoplegia.** Graefe's Arch., 1931, v. 125, p. 592.

The characteristic sign of associated (supranuclear) weakness is the inability of synergic muscles to carry out definite functions. These supranuclear paralyzes differ from those of the stem, base, or nucleus (in which certain muscles are unable to act) by absence of diplopia, the interference with ocular movements affecting each eye to an equal degree and in the same manner, that is the adductor of one eye and the abductor of the other eye.

Supranuclear paresis of a single eye-muscle is rare; in an undoubted form it can affect only the internal rectus. Supranuclear internus paresis is characterized by either total or impaired ability of the eyeball to turn inward, whereas adduction occurs without difficulty in convergence. In other words the cells of the internus nucleus are intact but the break in conduction is situated above the nucleus.

The pathway for voluntary movements directing sight leads from the center in the frontal lobe to the pons, crosses there to the opposite side, and in the posterior longitudinal bundle divides into fibers to the abducens and to the medialis nucleus. When the pathway higher up or at this dividing point is interrupted, the ability to direct the gaze is paralyzed; when the lesion lies in the posterior longitudinal bundle the lateral turning function of either the internal or the lateral rectus muscle may be disturbed; the two latter conditions have been termed anterior and posterior internuclear ophthalmoplegia.

Our normal inability voluntarily to abduct both eyes together prevents demonstration of the supranuclear character of a unilateral or bilateral paralysis of the abducens, and we cannot demonstrate clinically whether the fibers in the posterior longitudinal bundle going to the sixth nucleus are disturbed or whether the nucleus itself is affected.

The author reports briefly three cases of supranuclear paresis of the internus, seven of anterior internuclear ophthalmoplegia, and eight of posterior internuclear ophthalmoplegia. In eight cases the basic condition was epidemic encephalitis, and in five cases multiple

sclerosis. Syphilis was not a factor in any case. In the three cases of supranuclear paresis of the internus, and in the seven cases of anterior internuclear ophthalmoplegia, the pupil reacted sluggishly or not at all to light. In only two of the author's cases was there an associated facial paresis.

H. D. Lamb.

Ribas Valera, R. **Diagnosis of ocular paralysis and spasm by analysis of diplopia.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, June, p. 313.

Based on Marquez's method of coincidence, that is of finding the eye and muscle which answer to all the features of the diplopia of a given case, an elaborate chart has been devised. The following sources of error are, however, to be considered in diplopia analysis: paralysis of several muscles in the same eye, paralysis of muscles in the two eyes, coexistence of paralysis and contractures, previously existing heterophorias of high degree, fixation of paralyzed eye because of superior visual acuity, and the induced fixation by the paralyzed eye which is involved in certain procedures of examination, as pointed out by Adrogué. Ribas Valera does not agree with Adrogué's interpretation of the anomalous inclination and position of images observed in vertical diplopia, when using the Maddox rod on the sound eye; and he explains it by false projection of the sound eye resulting from the procedure.

M. Davidson.

Vogelsang, Kurd. **Abnormal eye movements.** Med. Klin., 1931, June 12, p. 887.

Kurd, in an article for the general practitioner, advises that children who have strabismus have their eyes examined with a cycloplegic at least once a year until six years of age.

Beulah Cushman.

5. CONJUNCTIVA

Donin, J. H. **Experience with iontophoresis in trachoma.** Russkii Ophth. Jour., 1931, April, p. 396.

The author is not enthusiastic about

the results of iontophoresis with copper sulphate in the treatment of trachoma. Corneal complications were not benefited by the use of this method. In most of the twenty-two cases treated by the author a decrease of conjunctival infiltration was noticed. In the management of trachoma iontophoresis may find its place as an adjunct to the more effective surgical methods of treatment.

M. Beigelman.

Hiwatari, K. **The presence of lymph follicles in the mammalian conjunctiva.** Graefe's Arch., 1931, v. 125, p. 403.

The conjunctivas of dogs and rabbits which macroscopically appeared entirely smooth were microscopically found free of lymph follicles. Lymph follicles occurred in dogs and rabbits as a reaction to various irritations to the conjunctiva; when this irritation was removed in rabbits, the lymph follicles spontaneously disappeared. Lymph follicles in the conjunctiva of cats disappeared spontaneously with age. Therefore the presence of lymph follicles in the conjunctiva of dogs, rabbits, and cats must be considered as pathological. *H. D. Lamb.*

Junius, Paul. **Remarks on the essay of Peters on our attitude toward trachoma.** Zeit. f. Augenh., 1931, v. 75, Aug., p. 11.

In a polemical article Junius shows by quotations from the literature that the views on the subject expressed by Peters twenty years ago have not received the general acceptance which the latter seems to think they have.

F. Herbert Haessler.

Malkin, B. M. **Iontophoresis in the treatment of trachoma.** Russkii Ophth. Jour., 1931, April, p. 387.

Iontophoresis with a one percent solution of copper sulphate was used in the treatment of thirty cases of trachoma. In advanced cases with changes in the tarsus or with trichiasis, iontophoresis proved to be entirely ineffective. In the early stages of trachoma, some relief of the subjective symptoms

as well as gradual disappearance of the follicles was observed.

Iontophoresis with copper sulphate has no specific value in the treatment of trachoma, and may be used only in conjunction with the established therapeutic methods. *M. Beigelman.*

Mata, P. **Surgical treatment of pterygium by extirpation and mucous graft.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, March, p. 177.

The Duverger-Velter procedure was successfully used in thirty-six cases of pterygium, half of them recurrent cases. Novocaine is used subconjunctivally to raise the pterygium, the latter is excised, and buccal mucosa is transplanted and carefully sutured in place with 6 to 8 silk sutures. The transplant gets pink in forty-eight hours, red in three to four days, and remains of conspicuous color for many months, but the color eventually disappears. No infections, necroses, or relapses have occurred. Sutures are removed on the fifth or sixth day. Because of conspicuous persistence of color for some time, young women are subjected to the operation only when pterygia are progressive. The advantage of the procedure is its guarantee against recurrence, which cannot be said of others except the Gomez Marquez conjunctival autoplasty. The author's procedure is illustrated. *M. Davidson.*

Neumann, J. **Iodin in the treatment of trachoma.** Brit. Jour. Ophth., 1931, v. 15, Sept., p. 518.

During the past four and a half years the author has used this method in fifty-eight cases, with satisfactory results. All cases were complicated by pannus and corneal ulcers. Five case histories are given in detail. The technique consists of everting the lids, drying the conjunctiva, and applying a ten percent tincture of iodine with a glass rod wrapped with cotton. After the iodine dries and the excess is removed with a dry piece of cotton the parts are smeared with an unirritating ointment. Should there be undue discomfort following the application a drop or two of

cocaine solution will control it. The application may be repeated in four to seven days. Massage and copper may be used during the interval. The author's indications for this procedure are trachomatous complications on the cornea, papillary hypertrophy, purulent secretion uncontrolled by silver nitrate, and purulent secretion when argyrosis is present. (Bibliography.)

D. F. Harbridge.

6. CORNEA AND SCLERA

Bruoth-Vojtech. Therapeutic action of wintergreen oil. *Oft. Sbornik*, 1930, v. 5, pp. 199-200.

Oil of wintergreen was used in massage of the tarsal conjunctiva and conjunctival folds in six cases of trachoma. It was also used in the form of inunctions according to the method of K. Sabatzky (see abstract of paper of Koldovsky-Kvetoslav) in ulcer serpens and erosions of the cornea. In no case was the ailment improved, and in most cases it was exacerbated.

G. D. Theobald.

Hoffmann, R. Mode of development of congenital corneal opacities. *Arch. f. Augenh.*, 1931, v. 105, Oct., pp. 161-168.

Hoffmann reports a case of bilateral congenital corneal opacities to which were attached fibers of iris tissue. He feels that the condition is not the result of intrauterine inflammation but of abnormal development. In all probability it is due to failure of the lens, in its development, to become entirely separated from ectoderm by constriction.

Frederick C. Cordes.

Jess, A. Gangrenous cachectic erythema with parenchymatous keratitis on a nonluetic basis. *Arch. f. Augenh.*, 1931, v. 105, Oct., pp. 39-46.

Jess reports a case of typical parenchymatous keratitis associated with what clinically appeared to be gangrenous erythema in a nonluetic child. The organisms recovered from the skin lesions were hemolytic streptococci and staphylococci in place of the usual pyocyanus bacillus. Both eyes showed typical interstitial keratitis. While this

type of keratitis is almost always due to congenital lues, it has been reported in tuberculosis, influenza, epidemic parotitis, tooth abscesses, malaria, and encephalitis. *Frederick C. Cordes.*

Knobloch, Rudolf. Etiology of scleritis. *Oft. Sbornik*, 1930, v. 5, pp. 212-214.

From 1920 to 1930 sixty-five cases of scleritis were treated in the Czech Ophthalmic Clinic at Prague. The etiology was as follows: tuberculosis, 79.3%; syphilis, 3.6%; staphylococcus, 3.6%; rheumatism, 3.6%; arthritis, 1.6%; undetermined, 11.1%.

As a tuberculous etiology was most frequent, the author thinks that, where the etiology is uncertain, antituberculous general treatment is the most suitable.

G. D. Theobald.

Koldovsky-Kvetoslav. Wintergreen oil as a remedy in ulcers of the cornea. *Oft. Sbornik*, 1930, v. 5, pp. 193-198.

The author used wintergreen oil according to Sabatzky's method (*Klin M. f. Augenh.*, v. 83) in two cases of ulcer rotundum, four cases of ulcer serpens, seventeen cases of infected foci from foreign bodies, two cases of herpes, and eight catarrhal ulcers. In no case did the defect heal with transparent cornea and without the appearance of an opacity. The author infected each eye of five rabbits with pus from these patients, treated one eye by Sabatzky's method and the other with optochin or cautery, and found Sabatzky's method unsatisfactory—the ulcers spreading beyond control. He says that there is no justification for employing oil of wintergreen in treatment, and especially not in ulcer serpens, as the pain is intense and better results may be obtained by other methods.

(Sabatzky's method: After using atropin and cocaine, the ulcer is freed of all debris (with a foreign body spud), touched with optochin, and then oil of wintergreen is massaged into it. Sabatzky says that the cornea regenerates and no scar is visible.)

G. D. Theobald.

Moratal, A. **Clinical biomicroscopic study of leprous keratitis.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, April, p. 234.

One hundred cases of leprosy, including 80 cases of complete, 14 of the nervous, 4 of the tubercular and 2 of the macular form, were submitted to slit-lamp study. In eighty-four percent of them corneal lesions were found. The diagnosis in one case was made only after a biopsy. The incidence increases with the duration of the disease, and within the first five years fifty percent were affected. The condition was generally bilateral, and least commonly of the complete or mixed form. Hyperplasias and vascular involvement of the bulbar conjunctiva and sclera were confined to the exposed palpebral fissure sectors. The commonest form was the punctate, consisting of fine round subepithelial dots uniformly scattered or arranged in sectors, or of larger discrete disc-shaped infiltrates situated paracentrally and inferiorly, or of gray dots on the posterior surface. The next characteristic form is the hyperplastic, salmon-colored patches simulating pterygium or trachomatous pannus, highly vascularized and prone to invade the cornea and to result in staphyloma, perforation, and phthisis bulbi. Ulcerative keratitis was observed in connection with other forms. The parenchymatous type was not observed.

M. Davidson.

Moretti, E. **Clinical research with the corneal microscope on trachomatous keratitis.** Ann. di Ottal., 1931, v. 59, June, p. 527.

Forty-four cases of trachomatous pannus were studied, demonstrating varying types, new vessel formation, and the direction taken by the blood current. The different phases of the beginning of the corneal ulceration and its development were as follows: About one millimeter in advance of the newly formed loop in the superior sector of the cornea and in the mesh of vessels, one, two and sometimes three gray shining round formations were seen, having a diameter varying from one-

half to one millimeter and pushing up toward the level of the cornea. They were not pervious to light rays but appeared to be masses of brilliant gray points like frayed silk. In general these formations persisted for from eight days to one month, after which they were replaced by ulcerations of funnel shape which after ten days to one month became smooth facets. (Bibliography.)

Park Lewis.

Penman, G. G. **Scleritis as a sequel of herpes ophthalmicus.** Brit. Jour. Ophth., 1931, v. 15, Oct., p. 585.

The course of a typical case is as follows: Two or three months after an attack of herpes ophthalmicus, usually accompanied by some iridocyclitis, the patient complains of redness and pain in the affected eye. On examination one or more nodules of a dark red color, and about the size of a lentil, are found beneath the conjunctiva, which is much injected, and has a glossy surface. The nodules are very slow in subsiding, usually taking months to do so: gradually getting smaller and darker, almost plum-colored, and finally disappearing, leaving sharply defined gray areas in the sclera where they have been situated. The conjunctiva over these areas is freely movable, and apparently normal.

The iris is atrophic, often in patches, which are found in that part of the iris nearest to the slaty areas in the sclera. The pupil often remains quite inactive and dilated. The condition is apt to relapse, and fresh nodules may arise in areas of the sclera hitherto unaffected. The great majority of the cases are over fifty years of age. In addition to the characteristic condition described, in which there is no concurrent corneal involvement, a sclerokeratitis sometimes occurs. It is possible that the condition may be an affection of the sympathetic nerve twigs accompanying the first division of the fifth nerve. The author reports four cases, three were characteristic, the fourth a sclerokeratitis. Three were males, two of them aged sixty-three years, one seventy-

seven years; while the fourth was a female aged seventy-seven years. Only one had any active evidence of herpes. (Seven references.)

D. F. Harbridge.

Riehm, W. **Pathogenesis of phlyctenular keratitis.** Arch. f. Augenh., 1931, v. 105, Oct., pp. 55-81.

From his experimental work, Riehm concludes that a real anaphylactic condition exists in phlyctenular disease. These phlyctenules result in most instances from endogenous bacilli. The relapses are dependent upon tuberculous gland processes that set the bacilli free in the circulation. The inflammation itself is an anaphylactic reaction, and arises from disintegration of the bacilli in the tissue, setting free a tuberculous antigen. There is a selective sensibility of the integuments of the eye. In addition to the endogenous, an ectogenous origin is possible where specific tuberculous material or tuberculin is introduced into the conjunctival sac. Any conjunctival inflammation reduces local resistance. Intercurrent general disease and other nonspecific factors may also reduce the effectiveness of the antibodies.

Frederick C. Cordes.

Seale, E. A. **Rapid interstitial degeneration of the cornea following choroidal hemorrhage.** Brit. Jour. Ophth., 1931, v. 15, Sept., p. 514.

This is the case history of a female aged fifty-one years, suffering from diabetes and carbuncles. At the time of first observation the cornea was mildly edematous, there was ciliary congestion, the tension was high, and surrounding the cornea, like a complete magnified arcus senilis but deeply situated, was a ring of greyish-yellow color. Next day this ring had extended, and two days later the degenerative process had extended over the entire cornea. Two weeks later the central portion of the cornea was ectatic. Twenty-five days after the first examination the patient died. While excising the eye for examination the cen-

tral portion of the cornea ruptured. Sections showed the corneal layers widely separated by fluid but no cell exudate. There was hemorrhagic detachment of the choroid and wide separation of the retina.

D. F. Harbridge.

Towbin, B. G. **On histologic changes in transplanted mucosa (Denig's operation).** Graefe's Arch., 1931, v. 125, p. 643.

This is a report of three cases in one of which the Denig transplant had been done six months previously, and in the other two eighteen months previously. Excisions from the median and lateral portions of these transplants showed assimilation with the surrounding trachomatous conjunctiva, so that under the new conditions they had become so diseased as to be indistinguishable from it, having undergone complicated morphological changes to approximate the structure of their new habitat. The disease had attacked the epithelial as well as the underlying connective tissue strata of the transplant to a degree evidently dependent upon the length of its sojourn there, and upon other individual factors. As in the familiar trachomatous condition, the process was in two cases more intense directly above the cornea than on the sides. The author does not, however, believe that the capacity of the mucous membrane for succumbing to trachomatous disease can be decided on the basis of his three cases only.

H. D. Lamb.

Zahor, A. **Axenfeld-Krukenberg spindle-shaped pigmentation of the cornea.** Oft. Sbornik, 1930, v. 5, pp. 241-243.

The author reports two cases of pigmentation of the posterior corneal surface. The typical case was in a female with myopic astigmatism and central chorioretinitis in both eyes. The second case, typical only in one eye, was in a male with hyperopic astigmatism and atrophic iris. Both eyes were without remnant of pupillary membrane. The author thinks the condition is pathologically acquired, not congenital.

G. D. Theobald.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Davids, H. Valuation of clinical observations in sympathetic ophthalmia. Arch. f. Augenh., 1931, v. 105, Oct., pp. 13-38.

Davids reports nine cases of sympathetic ophthalmia and makes certain deductions from his clinical observations. He believes that sympathetic ophthalmia is due to an ectogenous infection and that involvement of the second eye is due to metastasis of an exciter of uveal pathology. It is well known that the condition is relatively rare and there is a great variation in time of appearance of the disease in the second eye. In addition to the severe form, there are milder or even fleeting types. There must be conditions that in most cases prevent involvement of the second eye. In a minority of cases this natural protection is overcome and the second eye becomes involved. From his experience, Davids believes that disease of the general organism or perhaps of the eye itself renders the second eye susceptible. This would explain cases in which after a long interval the second eye suddenly becomes involved.

Frederick C. Cordes.

Rhiehm, W. Elective sensibility with particular reference to sympathetic ophthalmia. Arch. f. Augenh., 1931, v. 105, Oct., pp. 83-109.

From experimental work on "elective sensibility" in rabbits' eyes, Rhiehm had developed a theory of sympathetic ophthalmia. He feels that in sympathetic ophthalmia after a perforating injury we are dealing with an anaphylactic inflammatory reaction of the tissues to a bacterial antigen. This antigen is derived from an, at present, unknown microorganism that enters the eye at the time of the injury, and is able to produce the necessary antigen only in the human uveal tract. It is possible also that this may occur only in persons particularly predisposed to the disease. The involvement of the second eye is metastatic and depends in part upon "elective sensibility" and in part

upon the ability of the microorganism to multiply in the uvea of that eye.

Frederick C. Cordes.

Seale, E. A. Rapid interstitial degeneration of the cornea following choroidal hemorrhage. Brit. Jour. Ophth., 1931, v. 15, Sept., p. 514. (See Section 6, Cornea and sclera.)

Sondermann, R. Contribution to the mode of development of the anterior chamber and of the corneal endothelium. Graefe's Arch., 1930, v. 125, p. 407.

The corneal endothelium is not of mesodermal origin, as hitherto accepted, but ectodermal. The thickened ectodermal layer lying in front of the lens-vesicle is split parallel to the surface by the scleral fibers growing into it, so that these fibers are enclosed on both sides by epithelial cells; the endothelium arises from the cells lying upon the inner side. The formation of the anterior chamber begins in the periphery simultaneously with the development of the pupillary membrane, usually at the end of the second or the beginning of the third month. The aqueous humor arises through filtration from the relatively large capillaries in the tissue lying before the rim of the secondary eye-cup and before the pupillary membrane. Filtration is brought about from these capillaries by increased blood-pressure in the irido-scleral vein, due to its being compressed by the constantly increasing firmness of the sclera. Development of the anterior chamber and of the pupillary membrane may in a not inconsiderable percentage of cases be retarded, even as much as several months.

H. D. Lamb.

Székely, J. New observations on Fuchs's heterochromia. Zeit. f. Augenh., 1931, July, v. 74, p. 329.

The author presents a careful and detailed description of practically all observations on heterochromia that have been recorded in the literature. He compares statistically the occurrence of the various elements with his own observa-

tions in thirty cases. He believes that there are undoubted transitions between chronic uveitis and Fuchs's heterochromia which are characterized by changes in the stroma and pigment epithelium of the iris and which result in atrophy. The difference in structure between pupillary and ciliary segments of the iris, which is normally striking in pale irides, is emphasized in heterochromia, in that the pupillary zone, which normally is more complex than the ciliary, presents a striking paucity of pattern. In Fuchs's heterochromia the iris stroma undergoes changes which are independent of atrophy of the pigment or its faulty development. The pigment epithelium is involved in so many cases of Fuchs's heterochromia that its atrophy must be counted as a characteristic manifestation.

F. Herbert Haessler.

8. GLAUCOMA AND OCULAR TENSION

Bartels, Martin. The effect of repeated operations in hydrophthalmos congenitus and the concurrent development of high myopia. *Zeit. f. Augenh.*, 1931, v. 75, Aug., p. 17.

In the right eye of a child the intraocular tension did not become normal until two anterior sclerotomies, one paracentesis, five trephinations, and one iridectomy had been performed. In the left eye, three anterior sclerotomies and a paracentesis were without effect, then an Elliot trephining reduced the tension. In two years during which the tension was normal, the myopia rose from ten to twenty diopters.

F. Herbert Haessler.

Duke-Elder, W. S., Duke-Elder, P. M., and Colle, J. C. *Ophthalmomanometry.* *Brit. Jour. Ophth.*, 1931, v. 15, Oct., p. 575.

While the tonometer is an instrument of clinical value it cannot be accepted as efficient for accurate experimental research. For this purpose a good manometer is essential. Such an instrument should be able to inscribe a curve which has a sufficient amplitude to show small changes in gradient; should

respond without appreciable lag; and should reproduce variations of pressure correctly as regards amplitude and phasic relations. In the special case of the eye the issue is complicated by the fact that if any fluid enters or leaves the eye while the cannula is being inserted or during the establishment of pressure equilibrium the intraocular conditions are gravely upset.

The ordinary mercury manometer lacks two essentials, namely, it responds with an appreciable lag and the inertia of the mercury fails to reproduce the amplitude and phasic relations of the pressure curve with any degree of accuracy. The instrument these investigators have employed during the past two years seems to overcome these difficulties. An optical manometer consists essentially of a small chamber closed by a membrane carrying a mirror. Variations of pressure in the eye are communicated to the membrane, the excursions of which are amplified and recorded optically by a beam of light. The efficiency of such a manometer depends on (1) its sensitivity and (2) the accuracy of its response. The sensitivity is a static factor referring to the magnitude of its response (i.e., the excursion of the membrane) to the application of pressure. (Three illustrations.)

D. F. Harbridge.

9. CRYSTALLINE LENS

Arruga, H. A hook for cataract operation. *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, June, p. 347.

A modification of the strabismus hook consisting in giving the hook a semicircular curve equal in diameter to that of the cornea, placing it at an angle of forty-five degrees to the handle, and curving it in another plane as well, is illustrated. It has been found useful in intracapsular extraction, for the expression of cortical masses in the extracapsular method, and also for evacuation of blood from the anterior chamber.

M. Davidson.

Bartels, Martin. Habitual and spontaneous luxation of the lens. *Zeit. f. Augenh.*, 1931, v. 75, Aug., p. 20.

In a child of nine both lenses were small clear spherules which sometimes lay in the anterior and at other times in the posterior chamber. A rise of intraocular tension never occurred, the eyes were not irritated, and the vision with glass was 5/6. The lenses were kept out of the anterior chamber by pilocarpin miosis. In an adult the author observed spontaneous luxation of the lens into the vitreous. Between the man's sixty-second and seventieth years the lens remained clear and caused no inconvenience. With a cataract lens the vision was normal.

F. Herbert Haessler.

Braun, R. **Oversensitiveness to lens albumin in man and animals.** Arch. f. Augenh., 1931, v. 105, Oct., pp. 122-161.

Braun carried on extensive experiments on sensitiveness to lens albumen in guinea pigs, rabbits and man. He did not succeed in the production of precipitins with either foreign (pig) or own lens material (guinea pig and rabbit). The production of anaphylactic antibodies occurred only with foreign lens material. The author feels that the intracutaneous test (pig lens albumen) for lens sensitiveness as advocated by American authors is not reliable. The test is influenced by too many nonspecific factors to be indicative of sensitiveness to specific lens albumen.

Frederick C. Cordes.

Elschnig, A. **Intracapsular cataract extraction.** Zeit. f. Augenh., 1931, v. 75, Aug., p. 1.

With a normal tear sac it is possible to sterilize the conjunctiva by two days of irrigation with 1 to 5000 solution of mercury oxycyanide and Bietti's yellow oxide of mercury ointment. The author only operates when both cultures are sterile on two successive days. Post-operative injection has been reduced to 0.33 percent. Akinesis is produced by injecting two to four c.c. (depending on the thickness of the fat pad) of a two percent novocaine adrenalin solution, upward, inward, and outward from a single insertion of the needle below the zygomatic arch. The bridle suture is

indispensable. Anesthesia is produced by injecting one c.c. of two percent novocaine solution with adrenalin (after preliminary cocaine instillation). The conjunctiva is pushed forward when the knife is introduced, so that a conjunctival flap 2 to 3 mm. wide is produced. A suture is passed through the edges of the conjunctiva and laid aside in the form of a long loop. To perform a basal iris incision the conjunctival flap is picked up so as to give free access to the anterior chamber and a fold of iris is picked up with one point of the de Wecker scissors and incised. The capsule forceps is carried to the lower edge of the enlarged pupil, or below the pupillary margin if the pupil has begun to contract, grasping 1.5 mm. of capsule and loosening the lens by gentle lateral movements for eight to ten seconds. Then the forceps is lifted, while at the same time pressure is made at the lower corneal margin with a strabismus hook, which luxates and tumbles the lens so that its lower edge is delivered forward. Complications are no more frequent than with extracapsular operations. If the anterior chamber becomes deep immediately after operation this indicates that fluid vitreous has entered it. An injection of sterile air usually forces the vitreous back. In patients seventy-five years old, in the very fat or emphysematous, and in the very restless the author uses total iridectomy. *F. Herbert Haessler.*

Goldmann, Hans. **Critical and experimental observations on so-called ultrared cataract of rabbits and on cataract from heat.** Graefe's Arch., 1930, v. 125, p. 313.

The author found in the literature no reports indicating that infrared or heat rays could produce direct injury to the lens without affecting other parts of the eyeball. In the living pigmented eye, no changes in the lens from ultrared or heat rays occurred when the iris was screened. Whenever the iris was also exposed to these rays opacities in the lens began to develop. Consequently Vogt's cataract in the rabbit could not be explained as due to direct

action of the rays upon the lens but to contact with the lens of the overheated iris. In albino rabbits very slight changes at the lens-suture were produced but always in conjunction with disturbances in the cornea or iris. Measurements of the temperature of the iris in pigmented rabbits demonstrated that a higher temperature of the iris than fifty-five degrees was necessary for the production of cataract within fifteen minutes, and that by radiation an iris temperature of seventy degrees was easily obtainable. Irrigation of the cornea inhibited the formation of corneal opacities by protecting it from excessive overheating, while copious irrigation with solutions of lower temperature also inhibited the formation of cataract.

Heat cataract is really therefore uveitic cataract or the result of chronic heat action in which the iris particularly functions as the conveyor of heat to the lens. On the one hand the lens absorbs all rays and transforms the energy of the rays into heat, on the other hand it takes up convective warmth from the anterior part of the eyeball. If this opinion is correct, there must exist an indirect heat cataract without any damage to the iris, since changes in the iris are never found with heat cataract.

H. D. Lamb.

Goldmann, H. and Rolett, D. **So-called ultrared cataract.** Graefe's Arch., 1931, v. 125, p. 652.

The authors' experiments were directed to ascertain whether the feathery opacities issuing into the lens from its posterior suture, as reported by Meesmann and by one of themselves in a previous communication, were due to iridic or lenticular reaction.

One eye of a pigmented rabbit after pretreatment with eserine was exposed to irradiation directed to the iris alone at a temperature up to twenty-two degrees C. After forty hours (one hour daily) of such irradiation the feathery opacities were observable in the lens, arising from the posterior suture. When the lens alone was irradiated (even up to thirty degrees C.) no trace of these

opacities could be seen within the same interval of exposure, but the fundus was markedly affected. Hence the authors conclude that so-called ultrared cataract is an indirect manifestation of the effect upon the irradiated iris.

H. D. Lamb.

Hamann, J. **A typical sunflower cataract after war injury.** Zeit. f. Augenh., 1931, July, v. 74, p. 373.

Twelve years after injury during the war, a cataract was observed which suggested chalcosis. Because the opacity was very deep in the lens, and because roentgenograms did not disclose the presence of a foreign body, this diagnosis could not be confirmed. There were no manifestations of pseudosclerosis.

F. Herbert Haessler.

Hegner, C. H. **Successful cataract extraction due to a blow from a cow's horn.** Zeit. f. Augenh., 1931, v. 75, Aug., p. 55.

A patient with a shrunken cataractous lens suspended by very loose zonula fibers in his only eye was greatly annoyed by the trembling of the lens, but operation was thought too dangerous to attempt. He was highly myopic and had beginning corneal degeneration, and severe corneal astigmatism. With correcting glass his vision was only 0.3, but proved entirely satisfactory to him. Four years later a thrust from a cow's horn produced scleral rupture with extrusion of the lens in its capsule beneath the conjunctiva. From this situation it was easily excised. After uneventful healing the patient had the same vision as at the examination four years before.

F. Herbert Haessler.

Kankrov, A. L. **A double horn-shaped keratome for cataract operation.** Russkii. Ophth. Jour., 1931, April, p. 411.

There are four objections to the use of the Graefe knife in cataract work: (1) The lips of the wound are uneven because of the sawing movements. (2) The direction of the incision rarely remains in the same plane. (3) The knife is not convenient for work on the left

eye. (4) It is difficult to use in cases of pronounced enophthalmos.

The author modified an ordinary 1.3 cm. wide and 1.5 cm. high keratome in the following way: The point of the blade was removed to give a crescentic gap 3 mm. wide between the horns and higher at the center. If the horns are well sharpened, the incision is performed without any difficulty. The author used this modified keratome in fifty uneventful cataract extractions. In thirty of them a conjunctival flap was made by forming a conjunctival fold with the keratome previous to insertion of the instrument at the limbus.

M. Beigelman.

Menacho, M. Cystotomy in cataract extraction. Arch. de Oft. Hisp.-Amer., 1931, v. 31, April, p. 219.

Cystotomy has to be resorted to while we are waiting for the surgical ideal of a perfect intracapsular operation or for the medical ideal of cataract prevention. The author uses a right and left cystotome with which he makes a curved vertical incision. Capsulectomy is then practiced with forceps. He is thus enabled to pick up and secure a large bite of capsule. Good optic and cosmetic results are achieved by this procedure.

M. Davidson.

Peter, L. Studies in experimental röntgen-ray and radium cataract. Graefe's Arch., 1930, v. 125, p. 428.

It was found that one röntgen-ray skin erythema dose upon a rabbit's eye could produce permanent lens damage in the form of posterior axial complicated cataract as well as anterior lens opacities. This cataract appeared at the earliest 165 days after exposure to the x-rays. Similar changes were observed five and one-third months after 144 mg. hours of radium. The cause of the opacity probably lay in disturbance of vitality of the still living nonsclerosed lens fibers of the anterior and posterior axial cortex, leading to necrosis of these fibers. In the majority of cases new-formed healthy fibers forced the disturbed parts away from the subcapsular zone, as in ultrared or lamellar

cataract. But some cases were observed in which cloudy areas lay just beneath the posterior capsule eighteen months after raying. The latter change was essentially different from the ultrared and lamellar cataract and more nearly resembled complicated cataract.

H. D. Lamb.

Poyales, F. The Elschmig operation. Arch. de Oft. Hisp.-Amer., 1931, v. 31, June, p. 351.

The Elschmig operation, a combination of the violent Smith method and the imperfect forceps extraction, has given the author the best results, and can only be compared with that of Barraquer, with which it is struggling for ultimate supremacy. The operation as practiced by the author dispenses with speculum and retractor, uses only a superior rectus suture, and abandons this when the zonule is too elastic or rigid, the operation painful, or the capsule ruptures or slips out ahead of the cataract because of too wide a grasp of the capsule. Loss of vitreous is a complication which may be due to expulsive hemorrhage, and is not always to be imputed to the surgeon.

M. Davidson.

Rabinovitch, M. G. Endophthalmitis on the basis of supersensitiveness to lenticular proteins. Russkii Ophth. Jour., 1931, April, p. 372.

A lenticular extract, prepared in a manner closely resembling that of Verhoeff and Lemoine, was used for sensitization tests in nineteen cases of senile cataract. The reaction was positive in twelve cases, indefinite in five, and negative in two. In ten of the twelve positive cases, extracapsular extraction was followed by considerable irritation of the eye. Desensitization by repeated injections of the lenticular extract was effective in most of these cases. The author believes that his observations confirm the possibility of an "endophthalmitis phaco-anaphylactica". He advocates sensitization tests in all operative cataract cases. If the reaction is positive, desensitization should be re-

sorted to or intracapsular extraction should be performed.

M. Beigelman.

Sanna, G. **Clinical and experimental research of injuries of the capsule and of the posterior layers of the crystalline lens.** *Ann. di Ottal.*, 1931, v. 59, June, p. 566.

Wounds in the anterior surface of the capsule do not tend to remain open, but when the wound is small it is even difficult to keep it from closing. At the site of the wound there is a tendency to proliferation of the epithelium. In animals, when the wounds are extensive, we find an ulceration in the lenticular subcortical fibers. The presence or absence of epithelial tissue does not affect the aqueous humor or the lenticular fibers, which for a long period may remain transparent. It does affect the intrafibrillary cement, on which the action extends for a certain distance beyond the injured area. This clarifies the clinical observation that a lenticular opacity in human eyes in which there is no break in continuity of the lenticular fibers may be completely absorbed. In the eyes of the rabbit as shown by the author's experiments the lenticular epithelium takes on an importance which is not negligible in relation to the question whether it is the anterior or the posterior surface of the lens which is injured. In a purely mechanical way it may impede the entrance of the aqueous by its proliferation and may prevent absorption of the lenticular cement.

Park Lewis.

10. RETINA AND VITREOUS

Gonin, J. **The results from thermocautery obliteration of retinal tears.** *Ann. d'Ocul.*, 1931, v. 168, Sept., pp. 689-736.

Three hundred cases are reviewed, dividing them into three consecutive groups of one hundred each. This lengthy paper analyzes the series and compares the results with those of other authors. Causes for failure and reasons for not operating are offered. Numerous case reports are included to clarify the author's views.

From this review he concludes that his original contention is confirmed, namely that a tear in the retina is the determining cause of detachment and that obliteration of the tear will give complete and lasting cure in recent cases. Of his three hundred cases sixty-five were cured by one ignipuncture, requiring fifteen days of treatment. This proportion was doubled in those cases in which detachment had occurred within three weeks. Fifty-three others were cured by the use of repeated ignipuncture. In the entire series, which included only detachments of less than one year duration, the number of cures was approximately forty percent.

Immediate redetachment indicated insufficient obliteration of the tear, or the presence of another tear not reached by the ignipuncture. A relapse can occur months or years later by the development of a new tear independent of the initial accident.

H. Rommel Hildreth.

Kyrieleis, W., and Schroeder, C. **Functional changes in retinal vessels occurring during the last few months of normal pregnancy.** *Arch. f. Augenh.*, 1931, v. 105, Oct., pp. 110-121.

Changes in the arteries were found in the last few months of pregnancy in thirty-five percent of normal pregnant women. This occurred in the form of a tonic contraction of the retinal vessels, without exudate, hemorrhage, or loss of vision. In one group, it was associated with some increase in blood pressure, while in another sudden increase in body weight without edema developed along with the fundus changes. In a third class, there was increase in both blood pressure and body weight. After delivery, the vessels returned to normal in a short time. The authors feel that further study may throw some light on the problem of eclampsia.

Frederick C. Cordes.

Leoz Ortin. **Arterial hypertension and fundus oculi.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, April, p. 201.

After reviewing the physiology of the circulation, means of measuring arterial

tension, and the modern views regarding the mechanism and pathogeny of hypertension, the author offers the dictum that all ocular pathology is vascular and that all noninfectious fundal lesions are due to arterial hypertension. Transient amblyopias accompanied by slight blurring of the margins of the optic discs presage Bright's disease. Albuminuric, diabetic, leukemic, scorbutic, and anemic retinitis as well as that due to intoxication and autointoxication are instances of pure hypertension. Precocious ocular signs of hypertension are ocular fatigue, *muscae volitantes*, torpidity of the retina, scotomata, photopsias, metamorphopsias, and occasional miliary hemorrhages. Retinal apoplexy, senile hemorrhage due to local arteriosclerotic changes, and hyalin, fibroid, and granular-fatty degenerations do not belong to the picture of pure hypertension.

M. Davidson.

Lopez Enriquez. **Partial or incomplete retinal tears in detachments.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, March, p. 185.

Analyzing a case, reported and illustrated in detail, which exhibited a partial tear, that is a tear involving the external layers of the retina alone, the author suggests that all tears due to preretinal bands probably begin in that manner, that some do not progress to completion, and that spontaneous detachments without apparent tears arise by the same mechanism. Cystic degeneration may however lead to tears without the presence of tension from bands. All such cases without tears should have the benefit of a Gonin operation. The *modus operandi* of the Gonin is by pulling retina back toward choroid, and no results can be expected unless this is accomplished. The presence of bands and old detachments does not permit such a mobilization of the retina, hence the failures reported. Experiments are being conducted by the author embodying this principle of grasping and replacing the retina, and utilizing a diathermy cauterization.

M. Davidson.

Moore, R. F. **A device for the accurate localization of holes in retinal detachments.** *Brit. Jour. Ophth.*, 1931, v. 15, Oct., p. 545.

The author has devised a gold stud the circular base of which is 5 mm. across, the stem 2, 4, 6 or 8 mm. long and 1 mm. in diameter. The small end is flattened but rounded. The instrument is to be used as an adjunct to any method for calculation of the location of a hole in the detached retina.

The point for the cautery puncture through the sclera is calculated and marked by whatever method the surgeon is in the habit of using. The studs are sterilized by boiling and, if it is evident that the retinal hole is well away from the choroid, a stud with a long stem is used; if, however, the detachment is a shallow one, a stud with a 2 or 4 mm. stem is chosen. An incision is now made at the calculated spot, of such a size as will just admit the stem of the stud; the blade used being bent, 2 mm. wide, and 2.5 mm. long, with a stop. Before making the incision, and after sterilizing, the upper surface only of the blade is painted with an alcoholic solution of gentian violet and allowed to become quite dry; the object is to stain the edge of the cut so that the small incision is easily found again when the needle is withdrawn. The chosen stud is now inserted through the incision with a slight rocking movement, and is pushed right home; it is essential that its base shall be flat against the sclera. The tissues which have been reflected to expose the sclera are now pulled into place, and the inside of the eye is examined with the ophthalmoscope.

Examination may now reveal that the stud clearly is too far back, or not sufficiently far back, or that it is to one or other side of the hole, and the allowance to ensure that the hole of the puncture shall exactly correspond with the retinal hole is then calculated; the knowledge that the end of the stud is 1 mm. in width assists the calculation. Having thus determined the exact relationship of the correct puncture point to the point of insertion of the stud, the

soft tissues are again turned back so as to expose the sclera; everything is had in readiness, the stud removed, and the puncture immediately proceeded with. When the stud is removed there is a small escape of vitreous, but this is inconsiderable in amount. It will be obvious that the small incision for the insertion of the stud will by no means always be included in the area of subsequent cautery puncture.

D. F. Harbridge.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Bormacher, H. **Roentgenological demonstration of the foramen opticum.** *Zeit. f. Augenh.*, 1931, v. 75, Aug., p. 27.

The author describes the clinical findings in a case of retrobulbar neoplasm which illustrated the possibility of demonstrating enlargement of the optic foramen by means of roentgenography.

F. Herbert Haessler.

Bulson, A. E. **Choked disc (papilledema) due to disease of the sphenoidal sinus.** *Jour. Amer. Med. Assoc.*, 1931, v. 97, Sept. 26, p. 926.

There was rapid failure of sight (within three days) with constant deep-seated pain back of the globe. The ophthalmoscope revealed a swelling of the papilla of between three and four diopters, blurring of the disc margins, a few small punctate hemorrhages on the disc, and marked venous turgescence. Roentgenograms of the nasal sinuses showed marked dulness of the left sphenoidal sinus. No disturbance of the reflexes was found. Blood Wassermann was negative, but there was a marked leukocytosis. Opening and drainage of the left sphenoidal sinus, which was full of pus under pressure, was followed within forty-eight hours by decided reduction in the papilledema. The patient had fever and considerable malaise, which were thought to be due to toxic absorption. Three weeks after the operation, the vision had recovered to 15/15 full; and this was retained for a period of five years and perhaps longer.

Bulson feels that the possibility of

papilledema due to suppuration of the sphenoid sinus is definitely established. While he is opposed to undue haste in deciding to operate on the nasal sinuses, he feels that one is not justified in following a conservative course when the diagnosis seems conclusively determined (as in this case) as a result of the conditions found by cooperation of ophthalmologist, rhinologist, and roentgenologist. (Discussion.)

George H. Stine.

12. VISUAL TRACTS AND CENTERS

Charamis, J. S. **Binasal hemianopsia caused by a tumor in the hypophyseal region.** *Ann. d'Ocul.*, 1931, v. 168, Sept., pp. 737-746.

The patient, a woman aged thirty-three years, had symptoms of headache, nausea, and vomiting, with diminished vision for four months. Her doctor had diagnosed the condition as meningitis. At examination there was weakness of the right externus, a slight right exophthalmos, greatly diminished vision in each eye, and papillary stasis. The visual fields showed binasal hemianopsia. X-ray showed a small sella turcica but the anterior and posterior clinoids were abnormal. No points of calcification were present. Neurological examination demonstrated some psychical disturbances. The menses were lost with the beginning of symptoms. The blood and spinal fluid Wassermann tests were negative. Spinal fluid was under increased pressure.

Specific treatment was begun but the condition progressed. Surgical intervention was refused. Radiotherapy was given and one month later the condition had greatly improved. This was repeated with continued improvement. A meningeal tumor was diagnosed.

H. Rommel Hildreth.

13. EYEBALL AND ORBIT

Kredhova, Pavla. **Mucocele of the ethmoidal labyrinth.** *Oft. Sbornik*, 1930, v. 5, pp. 201-202.

A case of mucocele of the ethmoids is reported, which clinically resembled a flattened osteoma of the orbit. Rhinological examination and the x-ray were

of no help in diagnosis. The real diagnosis was made at the time of operation. After resection of the arched-forward osseous wall, the large cavity healed in the course of two months. The orbital symptoms, i.e., the exophthalmos and the deviation of the eyeball, disappeared within a few days.

G. D. Theobald.

Stajduhar, J. Solitary tuberculoma of the orbit. *Oft. Sbornik*, 1930, v. 5, p. 246.

A female aged sixty-eight years had a noninflammatory swelling of the lower lid. On palpation a nodule of the size of a hazelnut was found on the nasal side, between the eyeball and the orbital wall. It was encapsulated and easily removed. Histologically it was a typical tuberculoma. No organisms were found.

G. D. Theobald.

Stilo, A. On the reticulo-endothelial system of the eye (Goldman apparatus). Research on the method of intravital coloration. *Ann. di Ottal.*, 1931, v. 59, June, p. 566.

The morphological and biological cellular complex of the parenchyma of the connective tissue in which nutritional changes take place, which up to the present has not been regarded as an organ, is known as the reticulo-endothelial apparatus of Goldman. In order to determine the working of the cellular elements of these tissues there is introduced into the circulation of a living animal a suspension of an acid color, ordinarily tripan blue, the granules of which have little affinity for living protoplasm or nuclear cells but which attach themselves to dead tissues. As the cells die they take the stain in varying degree according to the stage of their retrogression as shown when the tissues are fixed for histological examination. The author employed this method in the study of the various ocular structures. It will prove, the author believes, to be an effective demonstration that will accentuate the relation of the cellular content to inflammatory processes. (Plates.)

Park Lewis.

Tauferova-Karaskova. Two cases of orbital abscess. *Oft. Sbornik*, 1930, v. 5, pp. 203-207.

The first case was one of metastatic orbital abscess during the third week of typhoid fever, and it was possible to culture the typhoid bacillus directly from the pus of the abscess. The abscess began acutely, but followed a chronic course. It was successfully treated with typhoid vaccine and x-ray. The second abscess was due to streptococci, lay deep in the orbit, and for eight days simulated a tumor. After incision and treatment with polyvalent streptococcic vaccine, complete recovery was obtained.

G. D. Theobald.

14. EYELIDS AND LACRIMAL APPARATUS

Illeruelo. My model of needle for sac-mucosa suture in dacryocystorhinostomy. *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, May, p. 277.

A simplified suture carrier to replace the Reverdin and Deschamps needles—a modification of that of Mooij employed in perineorrhaphy—is described and illustrated. Its principal feature is a slit on its convex surface directed away from the point, to permit threading after its passage, on the principle of the crocheting needle. *M. Davidson.*

Rosenblatt, Nute. A new painless method for irrigating the tear ducts, which can be used by laymen. *Zeit. f. Augenh.*, 1931, July, v. 74, p. 386.

Instead of inserting the cannula into the tear duct the author applied the end of it to one of the lacrimal puncta. In children he interpolates a thin piece of rubber tubing 30 cm. long between syringe and cannula. The method was found entirely satisfactory.

F. Herbert Haessler.

15. TUMORS

Castroviejo. Epibulbar nevocarcinoma with extensive corneal invasion. *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, May, p. 257.

Because of divergence of opinion as to the nature of epibulbar malignant

neoplasms, some regarding them as sarcomata and others as carcinomata, the detailed pathological study of a case after enucleation is submitted. The conclusion is arrived at that they are epitheliomata and that the melanotic tumors originate in nevi, that their prognosis is uncertain, that x-ray and radium treatment has not proved successful, and that, if local destruction and cauterization does not stop the invasion of the cornea, enucleation should be resorted to. *M. Davidson.*

Fleisher, B. and Wissmann, R. **Primary carcinoma of the ciliary body. Report of a case.** Arch. f. Augenh., 1931, v. 105, Oct., pp. 169-187.

A case of primary melanocarcinoma of the ciliary body had been clinically diagnosed as melanosarcoma. Primary melanocarcinomata are among the very rare tumors. They are of interest because they show that the epithelium of the ciliary body, which is an extension of the retina forward, has the ability to develop typical epithelial tumors.

Frederick C. Cordes.

Gala, A. **Freely moving cyst in the anterior chamber of the human eye.** Oft. Sbornik, 1930, v. 5, pp. 244-245.

A freely movable cyst was observed in the anterior chamber of an eye which had a secondary glaucoma following perforating injury leading to adherent leucoma. The cyst was ruptured during an iridectomy. The author thinks its contents were of lighter specific gravity than the aqueous, and may have included products of fatty degeneration.

G. D. Theobald.

Stallard, H. B. and Martin, P. P. **A case of dermofibrolipoma of the conjunctiva associated with other congenital abnormalities.** Brit. Jour. Ophth., 1931, v. 15, Oct., p. 580.

A boy aged three and a half years presented a swelling which extended from the upper to the lower fornix, nearly to the outer canthus and to within 4 mm. of the limbus, except at the eight o'clock position, where a tongue-like process reached the limbal mar-

gin. The surface was smooth and faintly lobulated. The mass was soft and projecting from the surface were four hairs. The swelling was confined to the conjunctiva and was freely movable.

The child was intelligent. There were present an accessory auricle and an imperforate auditory meatus, and the ramus of the mandible was gradually curved instead of at an angle.

Pathological study of the removed mass showed it to be a dermofibrolipoma of the conjunctiva. (Fifteen references and four illustrations.)

D. F. Harbridge.

Vancea, P. **Congenital cysts of the orbit of ethmoidal origin.** Riv. Oto-Neuro-Oft., 1931, v. 8, May-June, pp. 222-229.

A man of twenty-two years had since birth an indolent tumor-like mass below the left eyeball, at the lower nasal margin of the orbit. The tumor was movable and disappeared in the orbit if pressed. The enucleated tumor proved to be a cyst.

It is rare to see a normally developed eye in the presence of a congenital cyst of the orbit of ethmoidal origin. The author recognizes that this cyst originated from the mucous membrane of the ethmoid, for it was connected by its peduncle with the inner wall of the orbit and under the microscope its walls showed glands of a sebaceous type such as are normally found in the mucous membrane of the accessory sinuses. It is the opinion of the author that the cyst was formed from an inclusion of the ethmoid mucous membrane in the orbit through a congenital dehiscence of the os planum. (Bibliography and four figures.)

Melchior Lombardo.

16. INJURIES

Brodsky, B. S. **On the action of tear gases upon the visual organ.** Russkii Ophth. Jour., 1931, April, p. 409.

Chlorpicrin (nitrochloroform), used in chemical warfare, is known to cause an incapacitating lachrimation when present in the air in a 1 to 10,000,000 concentration. The author had the rare opportunity of observing the effect of

liquid chlorpicrin upon the eye. There was severe blepharospasm with lacrimation. The cornea was diffusely opaque, and three deeply infiltrated areas were seen in its parenchyma. The bulbar conjunctiva around the limbus seemed to be necrotic. Under ordinary treatment (atropin, airol ointment) the patient recovered full vision in this eye.

M. Beigelman.

Goldmann, H. **Critical and experimental observations on so-called ultra-red cataract of rabbits and on cataract from heat.** Graefe's Arch., 1930, v. 125, p. 313. (See Section 9, Crystalline lens.)

Havel, J. **Intraocular glass chips removed after ten years.** Oft. Sbornik, 1930, v. 5, pp. 188-190.

Ten years after the eyeball had been perforated from explosion of an acetylene lamp, two glass chips were removed from the vitreous of an eye which was painful, irritable and blind. The eye became quiet.

G. D. Theobald.

Havel, J. **Porcelain chip in lens for five years.** Oft. Sbornik, 1930, v. 5, pp. 191-192.

A chip from a broken plate perforated the cornea and lodged in the lens. Traumatic cataract resulted. After lens extraction (with the foreign body), the vision was corrected to 6/6.

G. D. Theobald.

Jacobs, M. W. **Ocular birth injuries.** New York State Jour. Med., 1930, Nov., p. 1355.

In this paper the author makes a plea for a routine and more careful examination of the eyes of new-born children, especially those delivered with forceps. Even when therapeutic measures are of little value, careful observation as to injury at birth may be an aid in classifying ocular conditions when seen in the adult. By far the most frequent disturbance found was retinal hemorrhage. Next in frequency are recorded tears of Descemet's membrane and extraocular paralyses. The hemor-

rhages disappear rapidly, and unless they are very large or in the macula they produce no ill effect on vision. In a series of 23 patients with retinal hemorrhages at birth, 13 were seen from three and a half to five and a half years after the first examination. The eyegrounds in all of these children were negative, and the defective vision, when present, was due to errors of refraction.

M. E. Marcove.

Knobloch, Rudolf. **Diagnosis and localization of intraocular foreign bodies by means of x-ray.** Oft. Sbornik, 1930, v. 5, pp. 179-185.

The Czech Ophthalmic Clinic, Prague, employs the methods of Vogt, Comberg, and recently of Stauning-Herrenschwandt, the last relying on differentiation of the bulb by means of air insufflated into Tenon's space. In all cases in which these methods were used the results were satisfactory. The author gives preference to a combination of the Comberg method with that of Stauning-Herrenschwandt.

G. D. Theobald.

Peter, L. **Studies in experimental röntgen-ray and radium cataract.** Graefe's Arch., 1930, v. 125, p. 428. (See Section 9, Crystalline lens.)

Srytr, F. **A case of erosion with mustard gas.** Oft. Sbornik, 1930, v. 5, pp. 215-222.

A few drops of mustard gas (dichloroethylsulphide) were spattered on to the cheek of a student during experimental work in the laboratory. Although the mustard gas was almost immediately neutralized it produced severe erosion of the skin of the face and hands and also produced irritation of the upper air passages, with considerable alteration of the general condition; and this was later complicated by septicemia. The left eye showed only a slight degree of erosion, but the right eye was in a serious condition. Irritation of the conjunctiva increased rapidly and reached its maximum on the fifth day. Then the inflammatory symptoms gradually decreased, but on the eleventh day they

again increased. Necrosis appeared, involving not only the bulbar conjunctiva but also the lower part of the cornea. At the same time, intense brown coloration in a circular ring was detected on the corneal margin. The coloration persisted for some days and then gradually disappeared. Five months after the erosion, the right eye was still irritated, and in the lower part of the cornea was a thick porcelainlike white opacity, into which deep vessels proliferated and in which small hemorrhages were found. The opacity was associated with marked corneal astigmatism. (Bibliography.)

G. D. Theobald.

17. SYSTEMIC DISEASES AND PARASITES

Averbach, M. **Ophthalmological contribution to the study of the sterilization of women.** *Ann. d'Ocul.*, 1931, v. 168, July, pp. 542-562.

Organic and functional ocular changes that arise directly or indirectly from the menses or during pregnancy are mentioned. The common explanation is on an endocrine basis. As to severe ocular conditions the question of interference is discussed. The author also points out the general physical and psychic effect of removal of the ovaries, and states that other methods of sterilization cause similar changes, varying only in degree. He concludes that the sterilization of women as a method of birth control to prevent recurrence of severe eye conditions would be unwise.

H. Rommel Hildreth.

Castresana, B., and Castresana, A. **Insulin in the visual apparatus.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, June, p. 332.

In two cases reported insulin caused visual disturbance, which slit-lamp examination showed to be due to cloudiness of the anterior cortical layers without a line of demarcation and without involvement of the capsule, and which disappeared on suspension of insulin. Reviewing the experimental studies, therapeutic effects, and complica-

tions of insulin as to the eye, the explanations suggested are either stimulation of the vagus, with vasodilatation of the ciliary body and decreased impermeability of the vessel wall, or modification of pH concentration.

M. Davidson.

Kreibig, Wilhelm, **Unusual eye findings in multiple carcinoma metastases.** *Zeit. f. Augenh.*, 1931, July, v. 74, p. 362.

In a young patient carcinoma metastases become evident because of a spontaneous fracture. During the course of observations new metastatic areas appeared from time to time in the skull, in other bones, in the skin, the lungs, the adrenals, and the orbits. The orbital lesions led to blindness. Histologically regressive choked disc was found. Very striking were innumerable loose clumps of foreign cells in the choroidal capillaries which were interpreted as tumor cells. They doubtless did not reach this situation by proliferation, but entered the circulation and were stopped by the small caliber of the capillaries. It is not possible to say when this transportation took place, but it is not likely that it was just ante mortem, and it was possibly as much as three months before. What other factor or factors are necessary for the development of metastases from hematogenously transported cells is entirely a matter of conjecture.

F. Herbert Haessler.

Kurz, J. **Ophthalmomyiasis.** *Oft. Sbornik*, 1930, v. 5, pp. 208-211.

An eight-year-old boy developed a large fluctuating mass in the region of the external orbital margin. The lids were edematous, and in the skin of the upper lid was a minute area which felt hard to the touch and extended into the deeper layers like a connective tissue cord. After incision the skin in the region of the fluctuation, a fly larva was taken out of the mound, which to entomologists appeared to be a larva of the Wohlfart fly. Probably the larva had been laid in the skin of the lid by the fly, and then it had bored through the

subcutaneous tissue to the orbital margin. The hard place in the lid was certainly at the point where the puncture had been made. (Bibliography.)

G. D. Theobald.

Rizzo, A. Experimental researches on ocular mycosis from *Actinomyces asteroides*. *Ann. di Ottal.*, 1931, v. 59, June, p. 539.

Ten animals were inoculated with 2 c.c. of a suspension of *Actinomyces asteroides*. No actinomycotic lesions, spontaneously developed, involving the uvea have been described. These inoculations were by way of the internal carotid, the subconjunctival tissue, intracorneally, into the anterior chamber, and into the vitreous. Single and multiple nodules of white infiltration in the cornea followed the subconjunctival injections. In those animals inoculated in the anterior chamber and in the vitreous small nodules formed in the iris and ciliary body; while microscopic abscesses developed in the uveal tract and sclera of those inoculated in the circulatory system. These abscesses when sectioned were found to contain small whitish-gray pultaceous masses which when transferred to culture media developed into actinomyces. It is therefore possible to obtain experimental infection of the eyes from actinomycosis, more particularly of the iris, ciliary body, and choroid. (Bibliography and plates.)

Park Lewis.

Sch lindwein, G. W. Cooperation between the oculist and the otorhinolaryngologist. *Pennsylvania Med. Jour.*, 1931, v. 34, June, p. 610.

The author makes a plea for closer cooperation between the oculist and the otorhinolaryngologist. The various common eye conditions in which there is a question of focal infection in the nose and throat are listed, with the author's personal results obtained by removal of these foci. After finding such foci of infection, even the most radical procedures may not give relief from the eye trouble. (Discussion.)

M. E. Marcove.

18. **HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY**

Blake, E. M. Yale's first ophthalmologist—the reverend Peter Parker, M.D. *Yale Jour. Biol. and Med.*, 1931, v. 3, May, p. 287.

This is a biography of a medical missionary who established the first ophthalmic hospital in China.

M. E. Marcove.

Butler, T. H. The results of ophthalmic operations. *Brit. Jour. Ophth.*, 1931, v. 15, Sept., p. 482.

This is a survey of the results of the most important operations in the author's personal experience during the past twenty-seven years in England and Palestine.

Results of cataract extraction for ten years, at the Birmingham eye hospital, were: 60 eyes, 70 percent useful acuity; failure ten percent; enucleated 3.3 percent; no record 20 percent. At the Coventry hospital, 107 eyes; 90 percent useful vision; failure 5.6 percent; excised 1.9 percent; no record 3.9 percent. Leamington hospital, 30 eyes; useful acuity 90 percent; failure 3.4 percent; excised 0 percent; no record 6.7 percent.

Dislocation of the lens may be congenital or traumatic. In congenital dislocation, if there is a perfect suspensory ligament treatment would better end with an iridectomy. The author removed successfully four lenses dislocated into the anterior chamber and two into the vitreous, all due to trauma.

Glaucoma is discussed under the division of secondary and primary. The latter is subdivided into congestive and noncongestive. In selected cases of secondary glaucoma iridectomy is indicated. In the congestive type eserine is of great value, and later iridectomy or one of the newer forms of operation may be indicated. In noncongestive cases it is meddlesome surgery to operate when repeated determinations with the tonometer fail to reveal any rise in intraocular pressure.

Trephining, while a favorite operation in England, is losing ground on

the Continent and in America. The author is more and more giving up this operation in favor of iridencleisis.

A discussion of strabismus, excision of the lacrimal sac, and removal of intraocular foreign bodies, together with a statistical record of these operations by the surgeon, is part of the contribution, which concludes by emphasizing the fact that the remarkable freedom from suppuration shown by wounds of the eye, whether surgical or accidental, is due to the presence in the tears of a lysozyme. Continued lachrimation diminishes the amount of this substance in the tears, so that the use of strong antiseptics is harmful.

D. F. Harbridge.

Caddy, Adrian. **The Royal Westminster Ophthalmic Hospital and its staff in the past.** *Brit. Jour. Opth.*, 1931, v. 15, Sept., p. 498.

This contribution is a résumé of the development of this institution together with the work of its corps of eminent surgeons, including such distinguished names as Guthrie, Forbes, Hancock, Canton, Dasent, Hogg, Power, Rouse, Cowell, MacNamara, Juler, Critchett, Frost, Hartridge, Wainwright, Dodd, Gunn, and Bass. *D. F. Harbridge.*

Cæsar, J. **Estimating the fitness of civil fliers, chauffeurs, railway employees, and sailors.** *Oft. Sbornik*, 1930, v. 5, p. 238.

This is an abstract of a long paper describing rules and regulations as to eyesight of various employees—of no general interest! *G. D. Theobald.*

De Masi, A. **A contribution to the cause and diffusion of blindness in Apulia.** *Am. di Ottal.*, 1931, v. 59, June, p. 513.

In fourteen countries definitions of blindness have been formulated, but these are for the most part for census purposes or for military requirements, and have little practical value. The author summarizes the statistics from various countries obtained by the Committee on Hygiene of the League of Nations, with the facts obtained as to

number, extent, and causes given for blindness in each. In Apulia the largest percentage of blindness comes from trachoma, from which bilateral loss of sight is produced in nineteen percent, monocular loss in sixteen percent, of the total incidence. The next largest cause is disease of the optic nerves, chiefly luetic. *Park Lewis.*

Keller. **A note on the functioning of the Institute of Ophthalmology of Hanoi.** *Arch. d'Ophth.* 1931, v. 48, Aug., p. 574.

This is a description of the organization and buildings of the ophthalmologic institute at Hanoi. The institute serves the double purpose of furnishing treatment to a population which is badly in need of such service, and of training medical students and doctors of Indo-China in ophthalmology.

It is interesting to note that in 1929, 974 persons were hospitalized for 19,528 days, 1092 operations were performed, and 9000 out-patients made 40,000 visits for treatment with a running expense for the Institute of less than \$3000.00. *M. F. Weymann.*

Menacho, M. **The standards of vision demanded of industrial workers.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, March, p. 135.

Our technical progress is making vocational guidance imperative, and vision plays a considerable rôle in the selection of industrial workers. Color vision is stressed disproportionately in connection with certain industries and other visual functions neglected, to the detriment of workers and of the requirements of industries. While errors of refraction can be corrected, many transport workers find glasses an inconvenience, and aviators cannot use them at all. Defective binocular vision makes the learning of certain trades, even under the most favorable conditions of adaptation, impossible in less than a year, and it is a serious handicap to many transport workers. Normal visual fields should be insisted on in transport workers. While color vision cannot be acquired by education when

congenitally absent, De Mets reported that the fifty-one Belgian railway employees who were found color-blind on a reexamination of 8000 workers had never met with an accident. The fact that in the Lyon silk industry region a higher grade of color vision is found than elsewhere points to the possibility that dealing with colors sharpens considerably the corresponding sense. The author would retain the present rigorous requirements in the matter of color vision for aviators and mariners, but would relax the requirements for railway employees. To make it safer he suggests a combination of illuminated form and color signals, the abandon-

ment of red and green colors, and utilization of the more visible yellow color, so that even color-blind persons would not be confused.

M. Davidson.

Thompson, E., and James, R. R. **The blindness of Tobit.** *Brit. Jour. Ophth.*, 1931, v. 15, Sept., p. 516.

Speculating upon the cause and cure of the blindness of Tobit the authors deduct that very likely, instead of being due to cataract (Bland Sutton), it was the result of an infection possibly trachoma and that the cure by gall from a fish depended upon its cholesterin content.

D. F. Harbridge.

NEWS ITEMS

News items in this issue were received from: Drs. E. G. Gill, Roanoke, Va.; M. Paul Motto, Cleveland, and G. Oram Ring, Philadelphia. News items should reach **Dr. Melville Black, 424 Metropolitan building, Denver**, by the twelfth of the month.

Deaths

Dr. Norton Luther Wilson, Elizabeth, New Jersey, aged seventy years, died November thirteenth of heart disease.

Dr. Louis B. Brose, Evansville, Indiana, aged seventy-two years, died November fifteenth, of hypostatic pneumonia.

Dr. Mike Clemont Jenkins, Pratt, Kansas, aged forty-five years, was killed, November thirteenth, when the automobile in which he was driving was struck by a train.

Dr. Theodore B. Schneideman, Philadelphia, aged seventy years, died October twenty-fourth, of prostatic hypertrophy, with urinary retention and broncho-pneumonia.

Dr. George S. Derby, Boston, aged fifty-six years, died December twelfth, after a very short illness.

Miscellaneous

Under the will of the late Mrs. Eline R. Cameron, Brooklyn, the New York Eye and Ear Infirmary was left \$7,500.

The question whether blind or sighted teachers are the better for the instruction of blind children came before the education committee of the London County Council. In July, 1930, the Council decided that in future no blind teachers should be appointed to a school for blind children. A great protest arose, however, from various blind organizations in England, and it was finally decided by the Council that their first recommendation was a mistake. In consequence, the sub-committee recommended that the original resolution be rescinded.

Between October 1 and December 6, 1932, the ninth graduate course in ophthalmology

will be given under the auspices of the American Medical Association of Vienna, at the I and II eye clinics of the Allgemeines Krankenhaus, Vienna. Lectures will be given by Profs. Joseph Meller and Karl Lindner, as well as by other members of the staff. This course was originated ten years ago at the suggestion of Dr. Edward Jackson of Denver. It is given in English and at a fee of \$250, for a minimum of ten, and a maximum of sixteen entrants. In 1931 there were seven more applicants than could be provided for in the course. For further information address Professor A. Fuchs, or the American Medical Association, Vienna, VIII, Alserstrasse 9, Café Edison.

Before the war Roumania had been very active in the eradication of trachoma within her borders. Since the war, however, there has been a very great increase of this disease and her financial ability to take care of it has decreased. She is doing the best she can to cope with the situation.

Due to the combined efforts of Columbia University and the National Society for the Prevention of Blindness a comprehensive study of the strain on eye sight in the school activities of children is being undertaken. The plan is to carry the investigation over a long period of time, and into as many fields as necessary. The first step is undertaken with children from five to ten years of age. The program of research will include the vision of the child, the lighting conditions under which he works, the materials he uses, and the length of time he uses them.

The staff of the Gill Memorial Eye, Ear and Throat Hospital announces to the profession the sixth annual spring graduate

course in ophthalmology, otology, rhinology, laryngology, facio-maxillary surgery, oral surgery, bronchoscopy and esophagoscopy, April 4 to 9, 1932. The class is strictly limited and the members are registered in the order in which the matriculation fee is received. The matriculation fee is \$50.00 of which \$15.00 must be paid on the date of registration. The personal contact of the student with the instructors is emphasized. Round table discussions are held daily.

The faculty will include the following guest members:

Edward H. Cary, M.D., Dallas, Tex.
L. W. Dean, M.D., St. Louis, Mo.
Wells P. Eagleton, M.D., Newark, N.J.
Arthur J. Bedell, M.D., Albany, N.Y.
Matthew S. Ersner, M.D., Philadelphia, Pa.
Lee M. Hurd, M.D., New York City.
Guy R. Harrison, M.D., Richmond, Va.
Webb W. Weeks, M.D., New York City.
Jonas S. Friedenwald, M.D., Baltimore, M.D.

Major George R. Callender, M.D., Washington, D.C.

E. A. Forshey, M.D., Southbridge, Mass.
Resident members will be Drs. Elbyrne G. Gill, John A. Pilcher, Booker Lee, and C. L. Crump all of Roanoke, Va.

The American Board for Ophthalmic Examinations will hold an examination in New Orleans on Monday, May 9, 1932, at the time of the meeting of the American Medical Association.

Necessary applications for this examination can be procured from the Secretary, Dr. William H. Wilder, 122 South Michigan Avenue, and should be sent to him at least sixty days before the date of the examination.

"Books for Tired Eyes" by Charlotte Matson is a list of books in large print that has just been published by the American Library Association and is available at most libraries. The books listed have been chosen with due regard for the differing tastes of readers. The titles are arranged under such subject headings as fiction, biography, travel, literature, history, books for young people, and books of general interest. A list of books in extra large type, called "Clear Type Series" also included, makes reading easy even for those whose eyesight is unusually poor.

At the annual meeting of the National Society for the Prevention of Blindness on Thursday, November 19, 1931, Dr. William Posey discussed "The evolution of the cataract operation" at the Russell Sage Foundation Building, New York City. Following Dr. Posey's address, Dr. Frank C. Parker, of

Norristown, Pennsylvania, presented a moving picture demonstrating cataract operations.

Societies

The Section on Ophthalmology of the College of Physicians of Philadelphia met on Thursday, December 17, 1931. Addresses were given by Drs. George Cross, Joseph V. Klauder, Perce DeLong, Charles E. G. Shannon, and Leo F. McAndrews.

The annual outing and dinner of the Rhode Island Ophthalmological and Otolaryngological Society was held recently at Wickford. Through the courtesy of Dr. George W. VanBenschoten the members of the Society enjoyed a yacht ride. Dr. Frank W. Dimmitt, Jr., was elected president, and Dr. Nathan A. Bolotow, secretary.

At the recent meeting of the Ophthalmological and Otolaryngological Section of the Cleveland Academy of Medicine, Dr. M. W. Jacoby was elected Chairman, and Dr. H. Rosenberger, Secretary of the Section for the ensuing year.

Personals

Drs. Claude S. Perry and John W. Wright, of Columbus, Ohio, announce the removal of their offices to 40 South Third Street.

Dr. Harry S. Gradle, of Chicago, addressed the Highland Park Physicians' Club, Detroit, December fifth, on the etiology of ocular diseases.

In the reorganization of the Medical Department, at George Washington University, Dr. William T. Davis has been appointed professor of ophthalmology.

Dr. Phillips Thygeson, formerly of Denver, is now in Tunis where he is spending six months in research work at the Pasteur Institute under Professor Nicolle who has done so much research work in trachoma.

Prof. Dr. W. Löhlein of Jena has accepted a call to the professorship of ophthalmology at Dreieburg in Breisgau, the position for so many years occupied by the late Professor Axenfeld.

Dr. Luther C. Peter, of Philadelphia, was the guest speaker of the Cleveland Ophthalmological Club, at the opening dinner meeting of the 1931-32 session. He presented a most instructive dissertation on "Monocular esotropia".

Dr. Clifford B. Walker has been appointed Associate Clinical Professor of Ophthalmology at the University of Southern California.